

A

HISTORY

OF THE

**Lehigh Coal and Navigation Company.**

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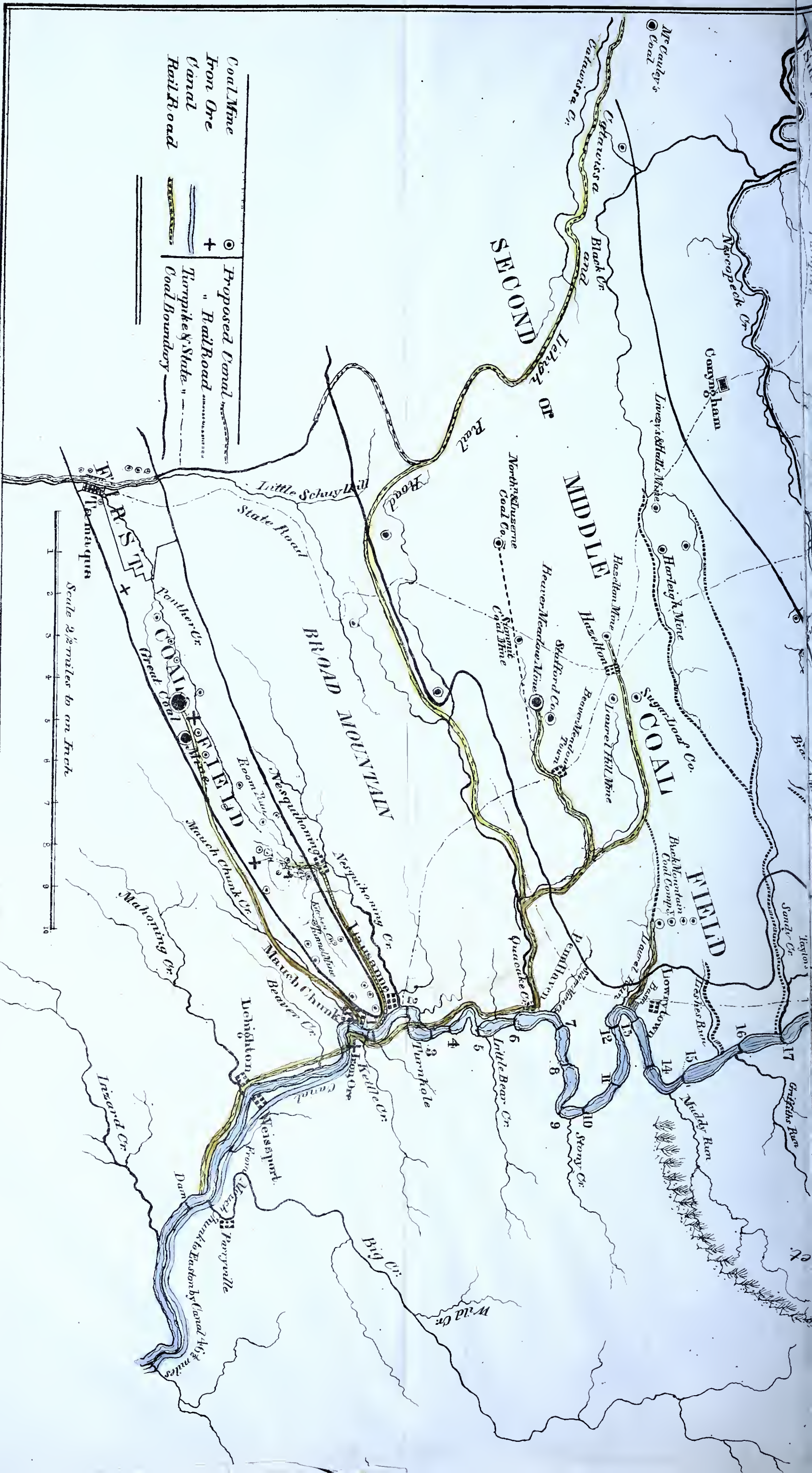
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PHILADELPHIA:  
PRINTED BY WILLIAM S. YOUNG,  
NO. 88 NORTH SIXTH STREET.

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1840.



Extent of those Fields of Anthracite Coal that will go by the Lehigh Navigation to a General market: \_\_\_\_\_

Of the First Coal Field, Belonging to the Lehigh Co. 6,000 acres.

" Second do. 90,000 "

Third do. 56,000 "

152,000 "



# A MAP of the LEHIGH NAVIGATION

above Mauch Chunk,

and of the

RAIL-ROAD FROM WHITE-HAVEN TO THE SUSQUEHANNA,

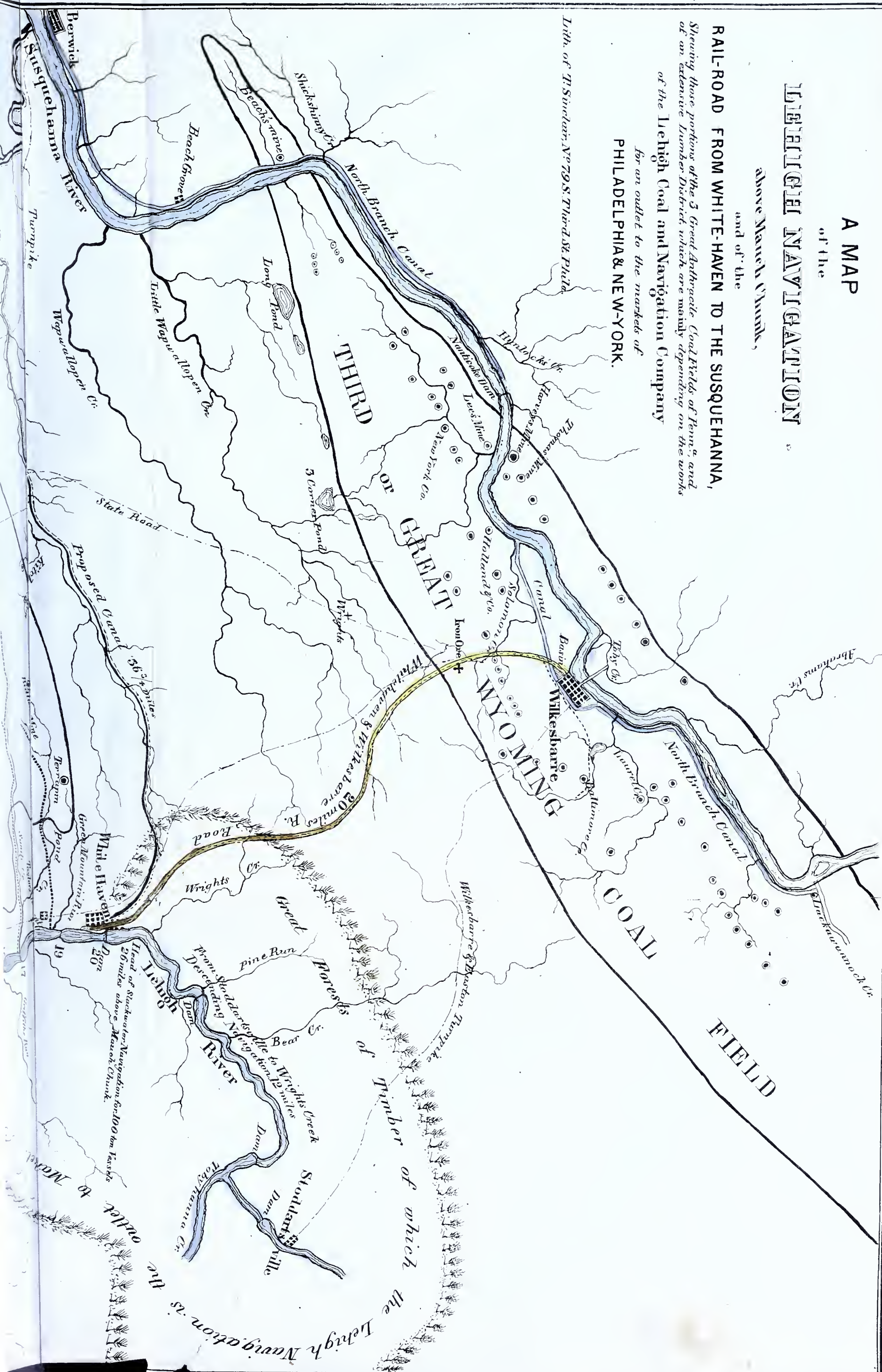
Shewing those portions of the 3 Great Anthracite Coal Fields of Penn<sup>a</sup>, and  
of an extensive Lumber District, which are mainly depending on the works

of the Lehigh Coal and Navigation Company

for an outlet to the markets of

PHILADELPHIA & NEW-YORK.

Lith. of T. Sinclair, No 79 S. Third St. Phila.





## HISTORY

OF THE

### **Lehigh Coal and Navigation Company.**

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#### *Lehigh Coal Mine Company.*

IN the year 1793 a company was formed under the title of the "Lehigh Coal Mine Company," who purchased from Jacob Weiss the tract of land on which the large opening at Summit Hill is made, and afterwards "took up," under warrants from the commonwealth, about ten thousand acres of land, embracing about five-sixths of the coal lands now owned by the Lehigh Coal and Navigation Company. The Coal Mine Company proceeded to open the mines, and made an appropriation of ten pounds (\$26.67) to construct a road from the mines to the landings, (nine miles!!) After many fruitless attempts to get coal to market over this nominal road, and by the Lehigh river, which, in seasons of low water, in its unimproved state, defied the floating of a canoe over its rocky bed, and after calling for contributions of money from the stockholders until calling was useless, the Lehigh Coal Mine Company became tired of the experiment, and suffered their property to lie idle for some years.

In the mean time they endeavoured to get the navigation of the Lehigh improved, and several laws were passed by the commonwealth without effecting this object.

To encourage and bring into notice the use of their coal, the company, in December, 1807, gave a lease upon one of the coal veins to Rowland and Butland



for twenty-one years, with the privilege of digging iron ore and coal, gratis, for the manufacture of iron. This business was abandoned, together with the lease, as, from some cause, they did not succeed in their work.

In December 1813 the company made a lease for ten years of their lands, to Messrs. Miner, Cist and Robinson, with the right of cutting lumber on the lands, for building boats; the whole consideration for this lease was to be the annual introduction into market of ten thousand bushels of coal, for the benefit of the lessees. Five ark loads of coal were despatched by these gentlemen from the landing at Mauch Chunk, two of which reached Philadelphia, the others having been wrecked in their passage. Four dollars per ton were paid to a contractor for the hauling of this coal from the mines to the landing over the road above referred to, and the contractor lost money. The principal part of the coal which arrived at Philadelphia was purchased at twenty-one dollars per ton, by White and Hazard, who were then manufacturing wire at the Falls of Schuylkill. But even this price did not remunerate the owners for their losses and expenses in getting the coal to market, and they were consequently compelled to abandon the prosecution of the business, and, of course, did not comply with the terms of the lease.

In December, 1817, Josiah White and Erskine Hazard, being desirous of supplying their works with anthracite coal, and finding they could not obtain it as cheaply from the Schuylkill region as they were led to believe it could be procured from the Lehigh, determined that Josiah White should visit the Lehigh mines and river, and obtain the necessary information on the subject. In this visit he was joined by George F. A. Hauto. Upon their return, and making a favourable report, it was ascertained that the lease on the mining property was forfeited by *non user*, and that the law, the last of six which had been passed for the improvement of the navigation of the river, had just

expired by its own limitation. Under these circumstances the Lehigh Coal Mine Company became completely dispirited, and executed a lease to Messrs. White, Hauto and Hazard, for twenty years, of their whole property, on the conditions that, after a given time for preparation, they should deliver for their own benefit at least forty thousand bushels of coal annually in Philadelphia and the districts, and should pay, upon demand, one ear of corn as an annual rent for the property.

Having obtained the lease, these gentlemen applied to the Legislature for an act to authorize them to improve the navigation of the Lehigh, stating in their petition their object of getting coal to market, and that they had a plan for the cheap improvement of river navigation, which they hoped would serve as a model for the improvement of many other streams in the state. Their project was considered chimerical, the improvement of the Lehigh particularly being deemed *impracticable*, from the failure of the various companies who had undertaken it under previous laws, one of which had the privilege of raising money by lottery. The act of 20th of March, 1818, however, gave these gentlemen the opportunity of "ruining themselves," as many members of the Legislature predicted would be the result of their undertaking. The various powers applied for, and which were granted in the act, embraced the whole scope of tried and untried methods of effecting the object of getting "a navigation downward once in three days for boats loaded with one hundred barrels, or ten tons," with the reservation on the part of the Legislature of the right to compel the adoption of a complete slack-water navigation from Easton to Stoddartsville, should they not deem the mode of navigation adopted by the undertakers sufficient for the wants of the country.

Messrs. White and Hazard, having levelled the river from Stoddartsville to Easton, in the month of

April, 1818, with instruments borrowed of the Delaware and Schuylkill Canal Company, (the only instruments at that time to be met with in Philadelphia,) and having also taken the levels from the river to the coal mines, to ascertain that a road could be constructed altogether on a descending grade from the coal to the navigation, and having ascertained from the concurrent testimony of persons residing in the neighbourhood, that the water in the river never fell, in the driest seasons, below a certain mark in a rock at the Lausanne Landing, were satisfied that there would always be a sufficiency of water in the river to give the depth and width of water required by the law, if the water were confined by wing dams and channel walls in its passage over the "riffles" from pool to pool. This plan was therefore decided upon for the improvement of the navigation, as well as the use of flat-bottomed boats, to be constructed for each voyage from the timber lands which were purchased for this purpose on the upper section of the Lehigh.

It may not be uninteresting to state the situation of the country along the Lehigh, as they found it at this period. From Stoddartsville to Lausanne, a distance of thirty-five miles, there was no sign of a human habitation; every thing was in the state of nature. The ice had not yet left the shores of the river, which runs for almost the whole of this distance in a deep ravine between hills from four hundred to one thousand feet high, and so abrupt that but few places occur where a man on horseback can ascend them. The adjacent country, though in many parts well covered with timber, had only a nominal value, as all hope of getting it to market was extinguished by the repeated failures of all attempts to improve the navigation, which was now considered impossible. The fall in this part of the river was ascertained to be, from Stoddartsville to Mauch Chunk, nine hundred and ten feet; or, on the average, about twenty-five feet to



the mile. Above the gap in the Blue Mountain there were but thirteen houses, including the towns of Lausanne and Lehigh, within sight from the river. Below the gap the country was improved. Rafts were sent, during freshets, from Lausanne downward, but no raft had ever come from above that point. From Mauch Chunk to Easton the fall was three hundred and sixty-four feet, making the whole fall from Stoddartsville to Easton twelve hundred and seventy-four feet.

The great first and second anthracite coal regions were then entirely unknown as such. Coal had been found on the summit hill, where the great opening of the Lehigh Company now is, and also at the Beaver Meadows. But there was then no knowledge that there were, in each location, continuous strata of coal, for many miles in extent, in each direction from these two points. Indeed the old Coal Mine Company for some years offered a bonus of two hundred dollars to any one who should discover coal on their lands, nearer to the Lehigh than the summit mines, but without its being claimed. The use of the coal from these locations was confined to the forge fires of the neighbouring blacksmiths and the bar-room stoves of the taverns along the road. Wood was almost the only fuel used in Philadelphia; and that and bituminous coal supplied the fire-places of New York and eastern cities. The only canal in Pennsylvania, at that time in navigable order, was one of about two miles in length, at York Haven, on the Susquehanna, and one made by Josiah White, at the Falls of Schuylkill, with two locks, and a canal three or four hundred yards long.

It was under these circumstances that the Legislature of 1818 granted the privileges of the "Act to improve the navigation of the river Lehigh" to Josiah White, George F. A. Hauto, and Erskine Hazard, which are *now* considered of such immense magni-

tude that they ought never to have been granted, and that those gentlemen were at that time pointed at as extremely visionary, and even crazy, for accepting them.

Having obtained the law, the lease on the coal mines, and the necessary information respecting them, and decided upon the plan of making the improvements, the next step of the pioneers was to raise the necessary capital for carrying on the work. Preliminary to this, they published, in pamphlet form, a description of the property, and the privileges annexed to it, and proposed to create a company to improve the navigation and work the coal mines.

The stock of this company was subscribed for on the condition that a committee should proceed to the Lehigh, and satisfy themselves that the actual state of affairs corresponded with the representation of them. The committee consisted of two of our most respectable citizens, both men of much mechanical experience and ingenuity. They repaired to Mauch Chunk, visited the coal mines, and then built a batteau at Lausanne, in which they descended the Lehigh and made their observations. They both came to the conclusion, and so reported, that the improvement of the navigation was perfectly practicable, and that it would not exceed the cost of fifty thousand dollars, as estimated, but that the making of a good road to the mines was utterly impossible; "for," added one of them, "to give you an idea of the country over which the road is to pass, I need only tell you that I considered it quite an easement when the wheel of my carriage struck a stump instead of a stone!!" This report, of course, voided the subscription to the *joint* stock.

It very soon appeared that there was great diversity of opinion relative to the value of the two objects. Some were willing to join in the improvement of the navigation, but had no faith in the value of the coal, or that a market could ever be found for it among

a population accustomed wholly to the use of wood. On the other hand, some were of the opinion that the navigation would never pay the interest of its cost, while the coal business would prove profitable. This gave rise to the separation of the two interests; and proposals were issued for raising a capital of fifty thousand dollars, on the terms that those who furnished the money should have all the profits accruing from the navigation up to twenty-five per cent., all profits beyond that to go to White, Hauto and Hazard, who also retained the exclusive management of the concern. The amount was subscribed, and the company formed under the title of the "*Lehigh Navigation Company*" on the 10th of August, 1818. The work was immediately commenced, the managers taking up their quarters in a boat upon the Lehigh, which moved downwards as the work of constructing the wing-dams progressed. The hands employed had similar accommodations.

On the 21st of October of the same year "*The Lehigh Coal Company*" was formed, for the purpose of making a road from the river to the mines, and of bringing coal to market by the new navigation. The capital subscribed to this company was fifty-five thousand dollars, and was taken on the same plan with that of the Navigation Company; but the managers were to be entitled to all the profits above twenty per cent., they conveying the lease of the coal mine company's land, and also several other tracts of land which they had purchased, to trustees for the benefit of the association. The road which now, for seven miles, constitutes the grading of the rail road to the summit mines was laid out in the fall of 1818, and finished in 1819. This is believed to have been the first road ever laid out by an instrument, on the principle of dividing the whole descent into the whole distance, as regularly as the ground would admit of, and to have no undulation. It was intended for a rail road,



as soon as the business would warrant the expense of placing rails upon it. A pair of horses would bring down from four to six tons upon it, in two wagons.

Every thing was thus making satisfactory advances toward the accomplishment of the object, when, late in the season of 1818, the water in the river fell, by an unparalleled drought, as was believed, fully twelve inches below the mark which has been mentioned as shown by the inhabitants to be the lowest point to which the river ever sunk. Here was a difficulty totally unanticipated, and one which required a very essential alteration in the plan. Nature did not furnish enough water, by the regular flow of the river, to keep the channels at the proper depth, owing to the very great fall in the river, and the consequent rapidity of its motion. It became necessary to accumulate water *by artificial means*, and let it off at stated periods, and let the boats pass down with the long wave, thus formed, which filled up the channels.

This was effected by constructing dams in the neighbourhood of Mauch Chunk, in which were placed sluice-gates of a peculiar construction, *invented for the purpose* by Josiah White, (one of the managers,) by means of which the water could be retained in the pool above, until required for use. When the dam became full, and the water had run over it long enough for the river below the dam to acquire the depth of the ordinary flow of the river, the sluice-gates were let down, and the boats, which were lying in the pools above, passed down with the artificial flood. About twelve of these dams and sluices were made in 1819, and, with what work had been done in making wing-dams, absorbed the capital of the company (which, on the first plan of improvement, would have been adequate,) before the whole of the dams were completely protected from ice freshets. They were, however, so far completed as to prove, in the fall of that year, that they were capa-

ble of producing the required depth of water from Mauch Chunk to Easton. In the spring of 1820 the ice severely injured several of the unprotected dams, and carried away some of the sluice-gates. This situation of things, of course, gave rise to many difficulties. It was necessary that more money should be raised, or the work must be abandoned. A difficulty also arose among the managers themselves, which resulted in White and Hazard making an arrangement with Hauto for his interest in the concern, on the 7th of March, 1820. On the 21st of April following, the *Lehigh Coal Company and the Lehigh Navigation Company agreed to amalgamate their interests, and to unite themselves into one company, under the title of the "Lehigh Navigation and Coal Company,"* provided the additional sum of twenty thousand dollars was subscribed to the stock by a given date. Of this sum nearly three-fifths were subscribed by White and Hazard. With this aid the navigation was repaired, and *three hundred and sixty-five tons of coal sent to Philadelphia, as the first fruits of the concern!* This quantity of coal completely stocked the market, and was with difficulty disposed of in the year 1820. It will be recollected that no anthracite coal came to market from any other source than the Lehigh before the year 1825, as a regular business.

The money capital of the concern was soon found to require an increase. The work was done, with the exception of one place at the "slates," where the channel and wing walls were made over the smooth surface of slate ledges, which projected alternately from one side of the river nearly to the other, and rose to within four inches of the surface of the water for a considerable distance along the river. From the nature of the ground, it was impossible to make the wing walls remain tight enough to keep the water at the required height, and it was evident that a solid dam must be resorted to, to bury the slates perma-

nently to a sufficient depth below the surface. This, it was estimated, could not be erected at a less cost than twenty thousand dollars. To raise this sum, in the circumstances of the company, was a difficult task. The small quantity of coal which had been brought down having so completely filled the market, and the inexperience in the use of that species of fuel having excited so many prejudices against it, that many of the stockholders doubted whether it would be possible to introduce the coal into general use, even if the navigation were made perfect. While this difficulty was in the process of arrangement, the work was kept alive by the advances of one of the managers. At length, on the 1st of May, 1821, a new arrangement of the whole concern took place, by which all the interests became more closely amalgamated. The title of the company was changed to "*The Lehigh Coal and Navigation Company.*" It was agreed that the capital stock should be increased by new subscriptions, and that in consideration thereof, and of certain shares of the stock to be given to them, J. White and E. Hazard would release to the company all their reserved exclusive rights and privileges, and residuary profits, and convey to trustees, for the use of the company, all their right to the water-power of the river Lehigh, and come in as simple stockholders; the company, at the same time, assuming the settlement of Hauto's claim upon White and Hazard. It was, however, agreed that the subscribers to the new stock should have the benefit of all the profits up to three per cent. semi-annually; then the original stockholders became entitled to the profits until they derived semi-annual dividends of three per cent.; and, finally, any excess of profit beyond these was to go to the stock allotted to J. White and E. Hazard, until the profit in any six months should be sufficient to produce a three per cent. dividend on all the stock. From that time all discrimination in the stock was to



cease, and all the owners to come in for an equal share of the profits in the proportion of shares of stock held by them.

The business of the company was to be carried on by five managers, two of whom were to reside at Mauch Chunk, under the title of acting managers, and superintend the navigation and coal department, while the others took care of the finances.

After this agreement was made, a number of the stockholders and their friends visited the works and property of the company, and although they expressed themselves agreeably disappointed in the appearance of things, yet the doubt of the possibility of getting a market for the coal induced a timidity in subscribing to fifty thousand dollars of new stock, which was only overcome by J. White and E. Hazard transferring, as a bonus to those who would subscribe, an amount of the stock held by them equal to twenty per cent. on the amount of the new subscription. In this way the whole fifty thousand dollars was subscribed. The dam and lock at the slates were erected, and one thousand and seventy-three tons of coal were sent to Philadelphia in 1821.

The unincorporated situation of the company, now that its operations were becoming more extensive, caused uneasiness among the stockholders with regard to their personal liabilities, and necessarily operated as a check to the prosperous extension of the business. In addition to which, the whole property and interests of the concern were virtually mortgaged to the holders of the fifty thousand dollars of new stock, which would render any extension of the capital excessively difficult. To remedy these difficulties, application was made to the Legislature, who, on the 13th of February, 1822, granted the act of incorporation under which the company are now operating. In this year the capital stock of the company was increased by new subscriptions amounting to \$83,950,

and two thousand two hundred and forty tons of coal were sent to market.

The boats used on this descending navigation consisted of square boxes, or arks, from sixteen to eighteen feet wide, and twenty to twenty-five feet long. At first, two of these were joined together by hinges, to allow them to bend up and down in passing the dams and sluices, and as the men became accustomed to the work, and the channels were straightened and improved as experience dictated, the number of sections in each boat was increased, till at last their whole length reached one hundred and eighty feet. They were steered with long oars, like a raft. Machinery was devised for jointing and putting together the planks of which these boats were made, and the hands became so expert that five men would put one of the sections together and launch it in forty-five minutes. Boats of this description were used on the Lehigh till the end of the year 1831, when the Delaware division of the Pennsylvania Canal was partially finished. In the last year forty thousand nine hundred and sixty-six tons were sent down, which required so many boats to be built, that, if they had all been joined in one length, they would have extended more than thirteen miles. These boats made but one trip, and were then broken up in the city, and the planks sold for lumber, the spikes, hinges, and other iron work, being returned to Mauch Chunk by land, a distance of eighty miles. The hands employed in running these boats walked back for two or three years, when rough wagons were placed upon the road by some of the tavern keepers, to carry them at reduced fares.

During the low water upon the Delaware it was found necessary to improve several of the channels of that river, and in this way about five thousand dollars were expended by the Lehigh Company, under the authority of the commissioners appointed by the state

for the improvement of the Delaware channels, whose funds were exhausted.

The descending navigation by artificial freshets on the Lehigh is the first on record which was used as a permanent thing; though it is stated that in the expedition in 1779, under General Sullivan, General James Clinton successfully made use of the expedient to extricate his division of the army from some difficulty on the east branch of the Susquehanna, by erecting a temporary dam across the outlet of Otsego lake, which accumulated water enough to float them, when let off, and carry them down the river.

The descending navigation of the Lehigh was inspected, and the Governor's license to take toll upon it obtained on the 17th of January, 1823, it having been in use for two years previous to the inspection. No toll was charged upon it till 1827.

The great consumption of lumber for the boats very soon made it evident that the coal business could not be carried on, even on a small scale, without a communication by water with the pine forests, about sixteen miles above Mauch Chunk, on the upper section of the Lehigh. To obtain this was very difficult. The river, in that distance, had a fall of about three hundred feet, over a very rough, rocky bed, with shores so forbidding that in only two places above Lausanne had horses been got down to the river. To improve the navigation it became necessary to commence operations at the upper end, and to cart all the tools and provisions by a circuitous and rough road through the wilderness, and then to build a boat for each load to be sent down to the place where the hands were at work by the channels which they had previously prepared. Before these channels were effected, an attempt was made to send down planks, singly, from the pine swamp, but they became bruised and broken by the rocks before they reached Mauch Chunk. Single saw-logs were then tried, and men sent down to clear them from the rocks as they



became fast. But it frequently happened that, when they got near Mauch Chunk, a sudden rise of the water would sweep them off, and they were lost. These difficulties were overcome by the completion of these channels in 1823, which gave rise to an increase of the capital stock, at the same time, of ninety-six thousand and fifty dollars, making the whole amount subscribed five hundred thousand dollars. In this year, also, five thousand eight hundred and twenty-three tons of coal were sent to market, of which about one thousand tons remained unsold in the following spring, there being still a great prejudice against the domestic use of coal. This prejudice was, however, on the wane, and very soon after this time became nearly extinct.

In 1825 the demand for coal increased so much that twenty-eight thousand three hundred and ninety-three tons were sent down the Lehigh, and the coal trade on the Schuylkill now commenced by their sending down by that navigation seven thousand one hundred and forty-three tons.

It became evident that the business on the Lehigh could not be extended as fast as the demand for coal increased, while it was necessary to build a new boat for each load of coal; besides, the forests were now beginning to feel the waste of timber, (more than four hundred acres a year being cut off,) and showed plainly enough that they would soon disappear, in consequence of the increased demand upon them; while, at the same time, the Schuylkill coal region had an uninterrupted slackwater navigation, which would accommodate boats in their passage up as well as down, and, of course, admitted any extension of the coal trade that might be deemed advisable. It should also be mentioned that almost the whole of the shares of the stock of the old "Coal Mine Company" had been purchased, so that the mines had become nearly the sole property of the Lehigh Coal and Navigation Company. These shares represented fifti-

eth parts of the whole property, and the purchase of them commenced at one hundred and fifty dollars per share; the last was purchased for two thousand dollars, after the slackwater navigation had been made. Under all these circumstances, it was concluded that the time had arrived for changing the navigation of the Lehigh into a slackwater navigation. The acting managers, who resided at Mauch Chunk, formed a plan for a steamboat navigation, with locks one hundred and thirty feet long and thirty feet wide, which would accommodate a steamboat carrying one hundred and fifty tons of coal. These locks were of a peculiar construction, adapted to river navigation. The gates operated upon the same principle with the sluice-gates in the dams for making artificial freshets, and were raised or let down by the application or removal of a hydrostatic pressure below them. The first mile below Mauch Chunk was arranged for this kind of navigation. The locks proved to be perfectly effective, and could be filled or emptied, notwithstanding their magnitude, in three minutes, or about half the time of the ordinary lock. Application was then made to the Legislature for an act for the improvement of the river Delaware upon this plan, but the commonwealth decided upon the construction of a canal along that river, provided the estimate of the expense of its construction should not exceed a limited amount per mile. This, of course, put an end to all thoughts of continuing the steamboat plan upon the Lehigh. Had this plan been adopted, there can be no doubt the transportation of coal upon it could have been effected *at an expense not exceeding four mills per ton per mile*, and the same steamboat could proceed (when the Delaware and Raritan Canal was done) to New York, Albany, Providence, &c. &c., without transshipment.

The large quantity of coal which had been brought to market and sold in the previous year produced a

profit which brought the semi-annual dividend fully up to three per cent. on the 1st of January, 1826, and placed all the stock of the company upon an equality from that time forward. In the previous years the dividend account stood as follows:—January 1, 1822, the first dividend made, was confined to the preferred subscribers, who then received three per cent. on their subscription of fifty thousand dollars, and the same dividend regularly afterward. July, 1822, gave the original subscribers one per cent., and from that time they regularly received three per cent., except in July, 1824, when the dividend to them was omitted. On the stock allotted to J. White and E. Hazard a dividend of one per cent. was made, January, 1824, and of two and a half per cent., January, 1825. These were the only dividends in which they participated, previous to the one which equalized the stock.

In 1826 there were thirty-one thousand two hundred and eighty tons of coal sent down the Lehigh. The business was now becoming so large that it was difficult to keep the turnpike to the mines in good working order without coating it with stone, and it was determined that the best economy would be to convert it into a rail road. The only rail road then in the United States was the Quincy Rail Road, about three miles in length, made in the fall of 1826. There had previously been a short wooden rail road, not plated with iron, at Leiper's stone quarry, of about three quarters of a mile in length, but this was worn out, and not in use. The rail road from Mauch Chunk to the summit mines was commenced in January, and completely in operation in May, 1827. It is nine miles in length, and has a descent all the way from the summit mines to the river. The road is continued beyond the summit about three-fourths of a mile, and descends into the mines west of the summit about sixty feet. With this exception, the whole transportation of the coal upon it is done by gravity, the empty wagons being



returned to the mines by mules, which *ride down* with the coal. This, also, was an arrangement made at the suggestion of Josiah White, entirely novel in its character; and enabled the mules to make two and a half trips to the summit and back, thus travelling about forty miles each day. Numerous branch rail roads are now constructed into the different parts of the mines.

In February, 1827, the balance of the stock, amounting to five hundred thousand dollars, was subscribed for; and, it having been decided that the Delaware division of the Pennsylvania Canal would be made, it was determined to go on with a canal and slack-water navigation upon the Lehigh, from Mauch Chunk to Easton. Mr. Canvass White, whose character as a canal engineer stood as high as any in the country, was invited to take charge of the work. He recommended a canal to be constructed of the then ordinary size, to accommodate boats of twenty-five tons. But the acting managers argued that the same hands could manage a much larger boat, and the only additional expense for a boat of one hundred, to one hundred and fifty tons would be for a larger boat, and for an additional horse or two to tow it. The whole lading being coal, which could always be furnished in any quantity, there need be no detention for a cargo for the larger boat, and the expense per ton would be very much lessened. It was at last concluded that the engineer should make two estimates, the one for the canal to be forty feet wide, and the other for a canal of sixty feet wide, each with corresponding locks. The difference in the estimates for the two canals in that location was so small (about \$30,000) that the largest size was unanimously adopted. The wisdom of this decision has been most clearly demonstrated, and other canal companies in the United States have since followed the example. The dimensions of the navigation were fixed at *sixty feet wide on the surface, and five feet deep; and the locks one hundred feet*

*long and twenty-two feet wide, adapted to boats of one hundred and twenty tons.* The work was at once laid out and let to contractors, who commenced their operations about midsummer.

The canal commissioners met soon after at Bristol, for the purpose of deciding upon letting the Delaware division of the Pennsylvania Canal. They were applied to, to construct it so as to correspond with the work going on upon the Lehigh; it was, however, insisted that the experience of Europe had proved that a twenty-five ton boat was the size most cheaply managed; and that even upon the New York Canal, which would admit of boats of forty tons, it rarely happened that the packets carried more than twenty-five tons. The commissioners at length concluded to make the locks of *half* the width and of the same length as those on the Lehigh, so that two of the Delaware boats could pass at once through the Lehigh locks, and thus save half the time in lockage. Had not the "experience of Europe" thus thwarted a noble work, sloops and schooners would, at this day, have taken in their cargoes at White Haven, *seventy-one miles up the Lehigh*, and have delivered them, without transshipment, at any of our Atlantic ports. The Canal Commissioners of the present day have already officially expressed to the Legislature their anticipations that it will soon be necessary to enlarge the whole of the Delaware division, to enable it to pass the immense trade that will undoubtedly be poured into it from the Lehigh.\*

This enlargement of the Delaware canal must unquestionably take place soon, or the enlargement of the Morris Canal, by our spirited neighbours of New York, will take off a very large proportion of its trade. The enlargement of twenty-six miles of the Delaware Canal, and of thirteen of its locks below Easton, with an outlet to the river Delaware at Black's Eddy, oppo-

\* See extract from the Canal Commissioners' Report at the end of this pamphlet.

site the feeder of the Delaware and Raritan Canal, would *yet* admit sea vessels to load or discharge at White Haven. The Delaware division is now only calculated to pass boats of sixty tons through the locks.

As so large a portion of the Delaware division was made by embankments along the river, the probability is, that the full-sized canal would not have cost more than the one now constructed, and the transportation upon it would not have cost so much by one-fourth.

The Lehigh slackwater navigation, from Mauch Chunk to Easton, was opened for use at the close of June, 1829, while the Delaware division was not regularly navigable until nearly three years afterwards, although it was commenced but about four months after the Lehigh. The contractors upon the Delaware division were suffered to use improper materials, and when finished by them the canal would not hold water. It was, at length, left to the care of Mr. Josiah White to make it a good and permanently useful navigation.

The want of the Delaware division, after the Lehigh was completed, caused the failure of eight dividends to the Lehigh Company, as they were obliged to continue the use of the temporary boats, which were very expensively moved on the Lehigh navigation, but were the only kind that could be used upon the channels of the Delaware river, which were still necessarily used to get to market. This not only prevented the increase of the company's coal business on the Lehigh, but also turned the attention of persons desirous of entering into the coal business to the Schuylkill coal region, which caused Pottsville to spring up with great rapidity, and furnish numerous dealers to spread the Schuylkill coal through the market, while the company was the only dealer in Lehigh coal. In this manner the Schuylkill coal trade got in advance of that of the Lehigh.

The capital of the company being limited, by the



act of incorporation, to one million of dollars, which amount had been expended in the operations of the company prior to the completion of the slackwater navigation, it became necessary, in 1828, to consider the means to raise the necessary funds to carry on the work. By this time a total change had taken place in the views of the community respecting the undertaking of the Lehigh Company. The improvement of the Lehigh had been demonstrated to be perfectly practicable, and the extensive coal field owned by them was no longer considered to be of problematical value. The Legislature of 1818 was *now* censured for having granted such valuable privileges, and all the "craziness" of the original enterprise was lost sight of. Hence applications to the Legislature for a change in their charter were thwarted by the influence of adverse interests. With such opposition, it was in vain to apply to the Legislature for an increase of capital, as it was evident that such a change could not be effected without a sacrifice of some of the valuable privileges secured by the charter of the company. Resort was therefore necessarily had to loans, to enable the company to complete the work required of them by law, and these were readily procured, in consequence of the good faith always evinced in the business of the company, and their evidently prosperous circumstances. The first loan was taken in 1828.

The claim upon the company arising from their assumption of the agreement of J. White and E. Hazard with G. F. A. Hauto for the purchase of his interest, before mentioned, was finally settled in 1830, by the purchase by the company of the remaining shares of the stock into which Hauto had converted his claim.

Upon the completion of the Delaware division of the Pennsylvania Canal, the operations of the coal business were very much simplified by the change from temporary to permanent boats, and the conse-

quent discharge of the host of hands required in chopping, hauling, sawing, rafting, piling, and otherwise preparing the large amount of lumber necessary for building, on the average of some years, of eleven to thirteen miles in length of boats, sixteen to eighteen feet wide.

In 1831 the company constructed a rail road, about five miles long, from the landing to the mines which had been opened along Room Run, which, like the one from the summit mines, operates by gravity, but has a more gradual descent toward the river.

As the time at which the original act granted to White, Hauto and Hazard required the navigation to be completed to Stoddartsville was now approaching, and the attention of the public was awakened to the second, or Beaver Meadow coal region, it became necessary to look to the commencement of that part of the company's work. It was evident that the descending navigation by artificial freshets would not be satisfactory to the Legislature, who had reserved the right of compelling the construction of a complete slackwater navigation. The extraordinary fall in the upper section of the Lehigh rendered its improvement by locks of the ordinary lift impracticable, as the locks would have been so close together, and would have caused so much detention in their use, as to render the navigation too expensive to be available to the public. The plan of high lifts was proposed by the managers as one that would overcome this difficulty, and, in 1835, Edwin A. Douglas, Esq., was appointed as engineer to carry it into execution. The work, as high as the mouth of the Quakake, was put under contract in June, 1835, and from thence to White Haven in October of the same year. The descending navigation above Wright's Creek was also put under contract in the same year.

On the 13th of March, 1837, the Legislature passed an act authorizing the Lehigh Coal and Navigation

Company to construct a rail road to connect the North Branch division of the Pennsylvania Canal with the slackwater navigation of the Lehigh, and increasing their capital stock to one million six hundred thousand dollars; at the same time *repealing* so much of the former act as required or provided for the completion of a *slackwater* navigation between Wright's Creek (near White Haven) and Stoddartsville. This act was accepted by the stockholders of the company on the 10th of May, 1837.

The whole work of the navigation required by the acts of the Legislature was completed, and the Governor's commission given to the inspectors to examine the last of it, on the 19th of March, 1838. The following is the report of the Commissioners to the Governor, showing their opinion of the work:—

TO THE GOVERNOR OF THE COMMONWEALTH OF PENNSYLVANIA.

The Commissioners appointed in the commission whereof a copy is hereunto appended, Report, that in pursuance of their appointment they met at Mauch Chunk, and from thence proceeded, on the 11th of June, inst., on board of a canal boat, up the navigation to the mouth of Quakake Creek, passing through lock No. 12, the point at which they closed their inspection in October last; commencing their present examination at this point, situated in the upper or second grand section of the Lehigh improvements, from thence passing along the navigation upwards, to lock No. 29, at White Haven, a distance of sixteen miles and  $\frac{5}{100}$ ths; one mile and  $\frac{93}{100}$ ths thereof being canal, and the remaining fourteen miles and  $\frac{12}{100}$ ths slack water navigation. On their way they carefully viewed and inspected the improvements in said section, consisting of sixteen stone locks and thirteen dams, all of which being constructed in the most substantial man-



ner, and of the best materials (the dams of timber and stone,) and perfected in a complete and workmanlike manner, and the whole of the improvements throughout being found in good and navigable order, and the tow-paths along the slack water navigation all lined with stones. The dimensions of the largest of the locks (No. 27, called "Pennsylvania Lock") being as follows: twenty-seven feet thickness of solid wall at the bottom, and ten feet on the top; thirty feet lift, three feet working guard, chamber of twenty feet in width, and one hundred feet in length, eighty-six feet clear of the swing of the gates, and containing nine thousand nine hundred and seventy-two cubic yards of masonry, and two hundred and forty-two thousand four hundred and nineteen feet, board measure, of timber work; and the largest of the dams being of the height of fifty-eight feet, and of the width of one hundred and ninety feet at the combing. For a particular description of the remaining locks and dams the Commissioners refer to the Table hereunto appended. On the said section there will yet be erected a bridge across the river, the solid stone abutments of which are completed, and the superstructure, of one span of one hundred and ten feet, is now under contract, to be finished by the 1st day of September next: in the mean time, the navigation will be kept in complete operation by means of a rope ferry, established at this point. The amount total, of lockage, in the sixteen miles before described, is three hundred and sixty-eight feet.

It will be seen by the report made on the 27th of October last, by the undersigned, that about eighteen miles of the second grand section or division of the river Lehigh were then in hand, but not yet finished. The commission, under which the undersigned now act, authorizes and enjoins upon them to examine and report upon that section, and which has been done by them in the manner herein set forth. In addition to

the particulars therein contained, they may state, that they found the river unusually full of water, which had risen so high as to float, from the pool at White Haven, nearly all the logs that had been accumulating for a length of time, and formed a very large mass of heavy timber, from one to three feet diameter, which they found lodged upon the dams, or lying on the face, or at the foot of them, the whole distance from White Haven to Mauch Chunk, thus testing the strength of the dams and locks by the united pressure of the water and the timber. In no instance have the noble works been injured, except the angle of one of the abutments, which was a little fractured by the fall of a large tree against it, in passing the dam. The undersigned are assured by Mr. Douglas, the able engineer, that a trifling expense will replace the broken stones, and give additional strength to the abutment.

The Company having now fully complied with the law, and in a manner honourable to themselves, and, (as Pennsylvanians, the undersigned say, with pride,) most honourable to the state, we deem them entitled to a license for charging and collecting the legal toll.

In ascending this division of the Lehigh, the Commissioners passed through a succession of the largest, best constructed, and most easily managed locks within their knowledge, and of such magnitude as greatly to exceed every public work of the kind in the United States. They were filled with admiration and delight as they examined these stupendous works, erected on that river, which, three years ago, was wild, shallow, and useless, and has now been converted into a calm and beautiful stream, suited for all purposes of navigation, either for trade or pleasure, and will, as it is hoped and contemplated, be, at no distant day, navigated by sea vessels, so constructed as to load at White Haven, and discharge at the ports along the Atlantic shore; to these may be added packets for

passengers, which, by their size and comforts, will convey to the centre of this district of country, visitors and travellers to whom it has hitherto been both closed and unknown.

The undersigned would farther state, that on the 10th of June inst., a boat laden with forty tons of merchandise was carried through the Lehigh improvements, or navigation, from Mauch Chunk to White Haven, in fourteen hours, drawn by one set of two horses—and that the locks on the whole of said navigation are of a capacity to pass boats of from one hundred and twenty to one hundred and fifty tons burden.

Witness the hands and seals of the Commissioners, at Mauch Chunk, this 12th day of June, in the year of our Lord 1838.

SAMUEL BRECK, [L. s.]  
 N. BEACH, [L. s.]  
 OWEN RICE, [L. s.]

*Northampton County, to wit:*

On the 12th day of June, A. D. 1838, before me, the subscriber, one of the justices of the peace in and for said county, personally appeared the within named Samuel Breck, Nathan Beach, and Owen Rice, who, on their solemn oaths and affirmations, duly administered according to law, severally declared and said that the facts set forth in the foregoing report are just and true, to the best of their knowledge and belief.

In testimony whereof, I have hereunto set my hand and seal, at Mauch Chunk, the day and year aforesaid.

J. S. WALLACE, J. P., [L. s.]



PENNSYLVANIA, SS.

In the name and by the authority of the Commonwealth of Pennsylvania.



JOSEPH RITNER,



JOSEPH RITNER. GOVERNOR OF THE SAID COMMONWEALTH,

To all to whom these presents shall come, sends greeting:

Whereas, pursuant to the eleventh and fifteenth sections of an act of the General Assembly, entitled, "An Act to improve the navigation of the river Lehigh," passed the 20th day of March, 1818, Commissioners were appointed by me, on the 19th day of March, 1838, to view and examine the remaining portion of the navigation of the river Lehigh, from lock No. 12 to lock No. 29, at White Haven, a distance of sixteen miles and  $\frac{5}{100}$ ths; one mile and  $\frac{93}{100}$ ths thereof being canal, and the remaining fourteen miles and  $\frac{12}{100}$ ths slack water navigation; upon the notification of the President and Managers of the Company for making the same, that the said remaining portion of the navigation of the river Lehigh was made and perfected agreeably to certain acts of assembly, referred to in the first section of an act passed the 13th day of March, 1837, entitled, "An Act authorizing the construction of a rail road to connect the North Branch division of the Pennsylvania Canal, at or within the borough of Wilkesbarre, with the slack water navigation of the river Lehigh," which authorize the making of the same—And whereas, the said Commissioners, Samuel Breck, Nathan Beach, and Owen Rice, Esquires, have reported to me in writing, under their respective hands and seals, and under their oaths and affirmations, that they have viewed and examined the said remaining portion of the navi-

gation of the river Lehigh, specified in their report, and that it is made and perfected in a complete and workmanlike manner, agreeably to the true intent and meaning of the acts of assembly on the subject; Now know ye, That in pursuance of the directions and authority in the said recited acts of the general assembly contained, I, the said Joseph Ritner, governor of the said commonwealth, do hereby permit, license and suffer the said President, Managers and Company to fix and appoint so many places on the said remaining portion of the navigation of the river Lehigh, so made and perfected as aforesaid, as will be necessary and sufficient to collect the tolls and duties granted by law to the said Company, from all persons having charge of all boats, arks, vessels, crafts and rafts passing up and down the same.

Given under my hand, and the great seal of the state, at Harrisburg, this 19th day of June, A. D. 1838, and of the Commonwealth the sixty-second.

BY THE GOVERNOR.

J. WALLACE, *Deputy Secretary.*

We have here the official evidence of the whole work of the Navigation, required by the Legislature, being completed, and in a manner highly satisfactory to the authorities. In its execution no money has been expended in ornament, nor withheld where it was deemed necessary for permanence and security.

The following tables show the detail of the whole.

*The following CONNECTED Table of the Distances, Dams, Locks, &c., on the UPPER GRAND SECTION of the Lehigh, is inserted in lieu of the SEPARATE Tables referred to in the Report of the Commissioners.*

*From Mauch Chunk up to*

	Miles.	Lift or Fall of Locks.	Length of Dams.	Height of Dams, water to water.	Height from Base.	Width of Base up and down stream. Gravel, 40 to 60 feet in addition
		Feet.	Feet.	Feet.	Feet.	
Lower Kettle Run, .	.309					
Lock No. 1. Dam No. 1, .	.607	15.33	200	15.33	20	50 feet
Upper Kettle Run, .	.694					
Lock No. 2, .	1.491	17				
Mouth of Nesquehoning, .	2.					
Lock No. 3, Dam No. 2, .	2.472	20	187	22	25	63 "
Turn Hole Rock, .	2.567					
Lock No. 4, .	3.247	14				
Lock No. 5, Dam No. 3, .	3.475	10	262	14	16	45 "
Bridge No. 1, .	3.653					
Lock No. 6, .	3.834	21				
Lock No. 7, Dam No. 4, .	4.512	20	194	23	27	65 "
Ox Bow, .	5.189					
Lock No. 8, .	5.392	21				

Middle of Lumber Yard Flat, .	5.714					
Lock No. 9, Dam No. 5, .	5.958	20	240	28	32	80 “
Little Bear Creek, . . .	6.050					
Lock No. 10, Burnt Cabin Flat,	7.494	16				
Lock No. 11, Dam No. 6, .	8.028	13	209	20	24	65 “
Bridge No. 2, . . .	8.264					
PENN HAVEN (mouth of QUAKAKE,) 8.674						
Lock No. 12, . . .	8.796	21				
Lock No. 13, Dam No. 7, Potosi,	9.440	22	180	27	29	80 “
Lock No. 14, . . .	10.456	18				
Lock No. 15, Dam No. 8, Barn						
Door, . . .	10.578	20	190	38	58	120 “
Bridge No. 3, . . .	11.252					
Stony Creek, . . .	11.513					
Lock No. 16, Dam No. 9, .	11.571	21	220	21	27	76 “
Lock No. 17, Dam No. 10, Co- ray's Roll-way, . . .	12.464	22	235	22	32	80 “
Drake's Creek, . . .	12.811					
Lock No. 18, Dam No. 11, .	13.792	25	212	25	35	81 “



# UPPER GRAND SECTION—Continued.

## From Mauch Chunk up to

	Miles.	Lift or Fall of Locks. Feet.	Length of Dams. Feet.	Height of Dams, water to water. Feet.	Height from Base. Feet.	Width of Base up and down stream. Gravel, 40 to 60 feet in addition.
Lock No. 19, Dam No. 12	. 15.082	25.50	210	25.50	32	80 feet.
ROCKPORT, mouth of LAUREL RUN, 15.262						
Lock No. 20, Dam No. 13,	. 16.021	25	205	25	34	"
Lock No. 21, Dam No. 14,	. 16.938	25	189	25	35	"
Shortz & Co.'s Roll-way, .	. 17.359					
Lock No. 22, . . . .	. 18.019	20				
Mud Run, . . . .	. 18.069					
M'Minn's Island, . . .	. 18.448					
Lock No. 23, Dam No. 15,	. 18.591	20	300	25	26	"
Leslie's Run, . . . .	. 19.					
Lock No. 24, Dam No. 16,	. 19.497	28	190	28	45	"
Hickory Run, . . . .	. 20.					
Sandy Creek, . . . .	. 20.637					
Lock No. 25, . . . .	. 20.976	20				
Lock No. 26, Dam No. 17,	. 21.569	25	237	34	35	"
Hay's Creek, . . . .	. 21.739					

Lock No. 27, Dam No. 18,	23.014	30	306	30	36	“
Lock No. 28, Dam No. 19,	23.940	22	293	22	27	“
Green Mountain Run,	24.025					
WHITE HAVEN,	24.750					
Lock No. 29, Dam No. 20,	24.849	23	375	23	28	“

Wright's Creek, head of Pool and

*Slack Water Navigation,* . 26.055

Pine Run,	28.348	CHANNEL.
Pine Forest, Dam & Shute, 9 feet.	28.943	
Mouth of Bear Creek,	30.761	
Rock Island,	32.158	
Long Eddy,	33.415	
W. Landing,	34.868	
Second Dam and Shute, 15 feet,	35.847	
Mouth of Tobyhanna,	36.613	336
First Dam and Shute, 11 feet,		
Great Falls, Stoddartsville.	38.261	935.83

# LOWER GRAND SECTION.

<i>From Mauch Chunk down to</i>		Miles.	<i>From Mauch Chunk down to</i>		Miles.
Weissport, . . . . .	.	3.859	Laubachsville, late Beil's Mill,	.	23.894
Parryville, . . . . .	.	5.645	Swartzville, . . . . .	.	24.386
Lizard Creek Ford,	.	6.742	Bierysport, . . . . .	.	26.304
Gap Basin, . . . . .	.	10.405	Allentown, . . . . .	.	29.384
Bowman's Landing,	.	10.786	Bethlehem, . . . . .	.	34.119
Kern's Ford, . . . . .	.	13.280	Freemansburg Bridge,	.	36.810
Henckee's Ford, . . . . .	.	13.887	Butz's Mill, . . . . .	.	37.555
Lockport Basin, . . . . .	.	15.381	Jenks' Mill, . . . . .	.	38.586
Shaffer's Basin, . . . . .	.	15.987	South Easton at <i>Abbott Street</i> ,	.	45.263
Kuntz's Ford, . . . . .	.	18.172	Easton, . . . . .	.	46.
Slate Dam, . . . . .	.	20.290	Inlet to Basin, . . . . .	.	46.148
Siegfried's Bridge, . . . . .	.	22.665	" Delaware River, . . . . .	.	46.216

*Summary of the Upper Grand Section—  
Mauch Chunk to Wright's Creek.*

Pools, 20.535 }  
 Canals, 4.670 } 26.055 miles.  
 Locks, .850 }  
 Canals, 60 feet wide top water line, 40 feet bottom,  
 5 feet deep.  
 Locks, total number 29; 20 feet wide; 100 feet  
 between quoins.  
 “ 86 feet clear of the swing of gates.  
 “ pass boats carrying more than 100 tons  
 of freight.

High Water Guard, 5 to 6 feet.

Working Guard, 3 to 4 feet.

The thickness of the walls somewhat varied,  
 according to the quality of the stone.

The 30 feet lift Lock is filled or emptied in two  
 minutes and a half.

*Summary of the Lower Grand Section—  
Mauch Chunk to Delaware River.*

Pools, 10. }  
 Canals, 34.584 } 46.216 miles.  
 Locks, 1.632 }  
 Canals, 60 to 65 feet wide top water line, 45 feet  
 bottom, 5 feet deep.  
 Locks, 5 guard—3 guard and lift—44 lift.  
 “ 22 feet wide, 100 feet between quoins.  
 “ 85 feet clear of the swing of gates.  
 “ 6 to 9 feet fall or lift.  
 “ pass boats carrying more than 100 tons of  
 freight.  
 Dams, 8—300 to 564 feet long.  
 “ 8 to 19½ feet high.  
 Total Fall, 353.2 feet.



## GENERAL REMARKS.

The Locks on the *Lower* Section of the Lehigh Navigation average  $7\frac{2}{10}$ ths feet lift to each; at this rate, the *Upper* Section, from Mauch Chunk to Wright's Creek, would have required 83 Locks, but the actual number, in consequence of the *high* lifts being adopted, is only 29, making a saving of 54 Locks. The total interruption or detention at each Lock may average 6 minutes, or 12 minutes going both ways, which would be  $10\frac{2}{3}$  hours for 54 Locks. Supposing one day to be thus gained by each boat making a trip up and down, by using the *high* lifts of the Upper Section instead of the *common* lifts, as in the Lower section, the following would be the result, viz.:

The cost of a boat of 100 tons, including the expenses of the crew, would be about 4 dollars per day, amounting in a season of 200 days to 800 dollars for each boat, which, on 100 boats per day, a quantity much below the capacity of the Navigation, would make 80,000 dollars saving to the public per annum; there would also be a saving to the Company of 54 Lock tenders, at 200 dollars each, say 10,800 dollars—making a total saving of 90,800 dollars per annum.

## LEHIGH NAVIGATION.

Kind of Navigation.	Size of the Canals.	Length in Pools.	Length in Canals.	Whole Length.	Feet of Lockage.	No. of Locks.	No. of Dams.	Size of Locks.	Height of Dams.
Lower Grand Section. Slack water navigation from the river Delaware to Mauch Chunk.	60 feet at top, 45 at bottom, 5 feet deep.	Miles. 10.	Miles. $36. \frac{216}{1000}$	Miles. $46. \frac{216}{1000}$	$360. \frac{87}{100}$	46	8	22 by 100 ft. lifts 6 to 13 ft.	6 to 16 feet.
Upper Grand Section from Mauch Chunk to Wright's Creek, slack water.	60 feet at top; 40 at bottom; 5 feet deep.	$20. \frac{535}{1000}$	$5. \frac{520}{1000}$	$26. \frac{055}{1000}$	$599. \frac{83}{100}$	29	20	20 by 100 ft. lift 10 to 30 ft.	16 to 58 feet
Slack water, . . . . .	Totals, . .	$30. \frac{535}{1000}$	$41. \frac{736}{1000}$	$72. \frac{271}{1000}$	$960. \frac{70}{100}$	75	28		
Upper Grand Section, from Wright's Creek to Stoddarts- ville. Descending navigation for lumber, with channels	18 inches deep	. . . . .	. . . . .	$12. \frac{296}{1000}$	336	3	3	22 ft. wide. 3 to 4 ft. fall.	6 to 13 feet.
Total navigation, . . . . .	. . . . .	. . . . .	. . . . .	$84. \frac{567}{1000}$	$1296. \frac{70}{100}$	78	31		

The grading of the rail road from White Haven to the Susquehanna was put under contract in December, 1837, after a very thorough examination of the country, (which occupied the engineer, E. A. Douglas, Esq., several months,) to ascertain the most favourable location for it through the very rough country between the two rivers.

The line adopted for the rail road is 19.702 miles (say about nineteen miles and three-quarters) from the Lehigh basin at White Haven to the basin on the North Branch Canal. The road generally is very favourable to the heavy trade which will be from the west eastward. The summit is overcome by three inclined planes, with stationary engines. The grade from the North Branch Canal is as follows:—

1.757 mile to foot of plane No. 3—	49 to 55 feet per mile ascent.
0.066 “	level.
0.998 “	plane No. 3, 5 to $5\frac{71}{100}$ feet per 100 feet ascent.
0.291 “	level.
0.715 “	plane No. 2, $8\frac{69}{100}$ feet per 100 feet ascent.
0.545 “	level.
0.826 “	plane No. 1, $9\frac{30}{100}$ feet per 100 feet “
4.644 “	summit level.
0.502 “	descent toward Lehigh, $\frac{189}{1000}$ of a foot per mile
9.448 “	descent to White Haven, 47 to 60 feet per mile.

Owing to the cheapness of coal at the inclined planes, it is estimated that the cost of transporting a ton over them will not exceed three cents each plane, which is made up as follows:—

Interest on 3 engines, value		
\$36,000, - - - - -		\$2160
Wear and tear, 10 per cent., -		3600
		—————\$5760
Coal, say 8lbs. {	140 120 80 } 340 horses power,	
per horse {		
power per {		
hour, {		
is per day of 10 hours $\times$ 200		
days, 2430 tons a year, at \$1, - -		2430
3 engineers at 600, - - - - -		1800
9 hands, (2 at each plane and one fireman,) at \$1 each for 250		
days, - - - - -		2250
		—————
		\$12,240

Brought forward,	\$12,240
Iron bands, (for ropes,) cost say \$10,000,	
and last four years, per year, - -	2,500
Interest on bands, - - - - -	600

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Business, say 1500 tons per day, or

300,000 tons per annum, ÷ - -	\$15,340	equal 5.1-10 cts. per ton for the
3 planes equal to - - -	1.7 cts.	for each plane.
Wear of cars, - - - - -	.5	
" of road, - - - - -	.5	
Oil, - - - - -	.3	

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Total cost, Cts. 3. per ton up each of the planes.

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Allowing the other parts of the road to cost three cents per mile a ton for transportation, and one cent for toll, the whole distance will be travelled for eighty cents a ton, which is believed to be about as low, including toll, as any road in the United States can be used for. The disadvantage of planes and higher grades than some other roads is balanced by the planes being on the edge of the coal basin, where coal, which is the principal item of expense in common cases, can be had at about one-fifth of its value in Philadelphia. Arrangements have been made at the planes to avoid the danger and delays sometimes attendant on them, on other roads.

The latest accounts from the engineer state that the part of the road from White Haven to Solomon's Gap, at the head of the inclined planes, a distance of fifteen miles, will, he expects, be passable by the 15th of July inst., (1840,) and the remaining five miles in all this year. The grading of these five miles, except two sections, will be finished by the 1st of August next, and the engines and rails are on the ground. The road will have strong iron T rails throughout, and will be completed in the best manner.

It is contemplated, when a large commercial business shall render it expedient, to pass loaded boats over the road, and thus avoid transhipment. At White Haven a basin is already constructed to accommodate the rail road trade; and the scite is provided for one at Wilkesbarre, whenever the traffic of



the North Branch Canal shall require it. The Nanticoke dam on the Susquehanna forms a fine pool of about four miles in length, admirably adapted to accommodate the trade which will descend the channels of that river, as it can there be arrested as it comes down by the freshets, and securely retained until it passes over the rail road.

Subscriptions were made to ten thousand and seventy-one shares of the new stock by the former stockholders, in proportion to their original shares, in September, 1839. The actual capital of the company was thus raised to \$1,503,550.

The completion of the rail road is all that now remains to be done under the requisitions of the acts of Assembly relative to the Lehigh Coal and Navigation Company. Their work will then be finished, and will embrace the slack water navigation of the Lehigh from Easton to the mouth of Wright's Creek, seventy-two and a quarter miles; the descending navigation from Stoddartsville to Wright's Creek running the whole distance through the pine timber forests, twelve and a half miles, and the rail road of twenty miles connecting seventy-one miles of the Lehigh Navigation with the Pennsylvania Canal, the whole forming a line of improvement which is believed to be located at least as favourably for extended business, if not more favourably than any other line of equal extent in the United States. It is also believed that no line of the same extent presented greater natural obstructions to navigation, and that none can now be navigated at a cheaper rate per mile. Owing to the peculiar construction of the high lift locks in the upper section, they can be filled in as little, or less time than the common locks of ordinary lifts, and although they consume more water in passing the tonnage, it has been ascertained by drawing off the pond above White Haven, and then noting the time it took to fill up at a very dry season, that there is water enough flowing in the Lehigh at all times to

fill one of the twenty feet lift locks every three minutes, even *at the HEAD of the slackwater navigation.*

The navigation, in its present state, below Mauch Chunk, is capable of passing, for two hundred and twenty days annually, two Delaware Canal boats, side by side, loaded with one hundred and twenty tons, in either direction, every five minutes, or two hundred and sixteen boats, containing twelve thousand nine hundred and sixty tons, each way, per day of eighteen hours; and for two hundred and twenty days, two million eight hundred and fifty-one thousand two hundred tons in each direction. Above Mauch Chunk, the capacity of the navigation may be estimated, at present, at half that amount, in consequence of the width of the locks not admitting two Delaware Canal boats together, although they are capable of passing a boat, *adapted* to these locks, of one hundred and twenty tons' burden. The Delaware Canal locks are only eleven feet wide.

The capacity of the rail road is limited by the planes. The present engines are calculated to be sufficient to pass three hundred thousand tons in two hundred days, working ten hours, or five hundred and fifty thousand tons, working eighteen hours, in two hundred and twenty days.

There would, however, be no difficulty in doubling the capacity of both navigation and rail road, whenever the trade may require it, at a very moderate expense.

The value of canals or rail roads, after they are completed, depends upon the products and markets they lead to, the comparative expense of using them, and the comparative distances by them to market. In all these respects, it is believed, the Lehigh Navigation and Rail Road are not excelled by any improvements of the kind in the United States. Connected as they are, at the eastern extremity, with the *city of Philadelphia* by the Delaware division of the

Pennsylvania Canal; by that, and the Delaware and Raritan Canal with the *city of New York*; and with this last city, *also* by the Morris Canal; and at the western extremity, by the North Branch, the Chemung, and the Erie Canals, with *Buffalo*, and by the great western rail road through the southern counties of New York, with *Portland*, both on Lake Erie, the *Lehigh improvements* form a very important link in one of the main lines to the interminable west. The North Branch Canal also connects the Lehigh improvements with the *west branch* of the Susquehanna, which, at no distant day, will also form a main line of communication between New York and the great west. A boundless field is thus opened, that will furnish all kinds of agricultural productions to go eastward to the best two Atlantic markets; and a new way is prepared for those markets to send manufactures, and other articles of consumption, to this great country in return.

The distances, and a comparison of the expense of using the Lehigh improvements will now be shown.

*Distances from Wilkesbarre.*

	To Balt.	Phila.	N. York.
The distance from Wilkesbarre, by the Susquehanna, to tide at Havre de grace, is 196 miles,	256	275	385
From Wilkesbarre, by the Union Canal, to the east side of Philadelphia,		282	392
From Wilkesbarre, by the Lehigh and Morris Canal,			193
From Wilkesbarre, by the Lehigh and Delaware, to tide at Bristol, is 152 miles,	279	170 and by Black's Eddy	218

The following shows the comparative cost of getting lumber from Wilkesbarre to Philadelphia by the Lehigh Works, and by the Susquehanna and Chesapeake and Delaware Canal, which is the route it *now* takes.

From Wilkesbarre to Havredegance, freight by the	
<i>channels</i> of the river, - - - - -	\$1.75
Risk or insurance, 10 per cent., - - -	1.00
Freight from Havredegance to Philadelphia, -	2.00
Loading and unloading, - - - - -	30
	——\$5.05 per 1000 feet
From Wilkesbarre to Havredegance, by <i>canal</i> , 196	
miles, at $1\frac{3}{4}$ cts. for toll and freight, - -	3.43
Loading and unloading, - - - - -	30
Present freight from Havredegance to Philadelphia, 2.00	
	——\$5.73 do. do.
From Wilkesbarre to White Haven, by rail road,	
20 miles, and loading and unloading, - -	1.00
Freight as <i>now</i> paid, including toll, to Philadelphia,	
by Lehigh and Pennsylvania Canals, - -	3.00
Unloading, - - - - -	15
	——\$4.15 do. do.

It thus appears that the distances are very much in favour of the Lehigh route to both Philadelphia and New York, and that lumber can be taken to either of those markets, by the Lehigh route, at a cost less by about twenty per cent. than by the route which it now ordinarily pursues; and lumber, it must be recollected, from its bulk and weight, is probably the most unfavourable article on which the comparison can be made. If *lumber* can take this route with advantage, every other article can do so with greater advantage.

### *General Table of Distances.*

From Montezuma, on the Erie Canal, to New York, viz.,	
By the Erie Canal, - - - - -	365 miles
By the Lehigh and Morris Canal, - - - - -	389 "
By the Lehigh, Black's Eddy, and Delaware and Raritan, -	413 "
From Montezuma, on the Erie Canal, to Philadelphia, by the Le-	
high and Delaware Canal, - - - - -	366 "
Elmira, by the rail road through the southern counties in New	
York, is distant from Portland, on Lake Erie, 200 miles. At	
Portland the harbour was clear of ice this year one month	
earlier than the harbour of Buffalo.	
From Elmira, by Erie Canal, to New York, - - - - -	444 "
" " " Lehigh and Morris Canal, to New York, -	312 "
" " " " and Delaware and Raritan, to N. York, -	337 "
" " " " and Delaware division, to Philadelphia, -	287 "

From the above it appears that it is about equally distant from Montezuma, by the Erie Canal, to New



York, as from the same place to Philadelphia by the Lehigh route. Also, that from Elmira it is one hundred and thirty-two miles farther to New York by the Erie Canal than by the Lehigh route, and one hundred and fifty-seven miles farther than to Philadelphia.

From Northumberland, at the junction of the north and west branches of the Susquehanna, the Lehigh route to New York is one-ninth nearer by the Delaware and Raritan Canal, and one-fifth nearer by the Morris Canal than by any other canal routes.

From the mouth of the Juniata, the distance to New York by the Lehigh route and Morris Canal is about the same as by the Union Canal.

It may not be amiss here to mention that the route by the Lehigh, so far from taking tolls away from the Pennsylvania state improvements, as it has generally been supposed it would, will actually bring into use a greater number of miles of those improvements than the Union Canal. By taking Wilkesbarre, Northumberland, and the mouth of the Juniata for starting points, and supposing an equal tonnage to go from each to New York and Philadelphia by the Lehigh route, it will be found that thirty-five per cent more miles will be travelled on the state canals than by the Union Canal route, and about the same number of miles as by the tide-water canal route.

The route from the western part of New York, by the Susquehanna and Lehigh, possesses the advantage of a more southern location than the Erie Canal, which will make the season of navigation longer by about one-fifth, and will enable the western merchants to get their produce into market in the spring, and their return goods at home, by the time the Erie Canal is opened for navigation. This route also possesses the advantage of affording the choice of Baltimore, Philadelphia, and New York as the market for western produce; and the decision of the choice be-

tween the two latter need not be made before reaching Easton, on the Delaware, where the prices of the preceding day in both markets may be ascertained. This is an advantage which the Lehigh route possesses over all others, and will, no doubt, be a powerful inducement to give it a preference over the Erie Canal. What portion of the great western trade, and of that of the Erie Canal, will take this line, will depend upon the *cheapness of transportation* upon it; the distances, and southern location, and choice of markets, all being evidently in its favour. That the business of the west will, in a few years, be greater than both lines can accommodate, seems now scarcely to admit of a doubt. Hitherto the western states have consumed their own grain, and some of them have been importers, in consequence of the emigration westward increasing faster than the agricultural products of those states. The Canal Commissioners of New York stated, only a few years ago, that but one-seventeenth of the trade of the Erie Canal originated beyond the confines of New York. Now, some of these western states are pouring their agricultural products into the Erie Canal, and it is already found necessary to enlarge its dimensions, to enable it to accommodate them.

It will be seen, on reference to the map, how large a proportion of the state of New York, which has, thus far, furnished sixteen-seventeenths of the trade of the Erie Canal, lies nearer to Philadelphia and New York by the Susquehanna and Lehigh route than to New York by the Erie Canal and North river. A large amount of tonnage from this section of country, and from the northern counties of Pennsylvania, has, for many years, sought a market by the channels of the Susquehanna in arks, and on rafts, in preference to taking the northern route by the Erie Canal. This trade will unquestionably be diverted into the Lehigh channels, if distance, expense, and risk be at all taken into the consideration of its own-

ers. Some idea of the amount of trade thus annually passing down the North Branch may be formed from the following certificate.

“We the subscribers, from actual observation, are enabled to, and do hereby certify, that in six days, to wit, from the 18th to the 23d of May inst., there floated down the north branch of the Susquehanna, past the village of Cattawissa, 2688 arks and 3480 rafts, the latter bearing top loading to the amount of at least 5040 tons.

CHRISTIAN BROBST,  
ERASTUS GOODRICH,  
HORACE GOODRICH,  
JACOB DYER,  
TENCH C. KINTZING, JR.

CATTAWISSA, May 24, 1833.

The average weight of the arks and rafts was estimated by Mr. Brobst to be forty-five tons each, making the whole, with the “top loading,” amount to 282,600 tons, or enough to load 94,200 rail road cars with three tons each.

This was the amount of tonnage which descended in only one freshet, several of which annually occur.

By a recent statement, the quantity of lumber which passes down the Susquehanna is equal to two hundred and fifty thousands *of thousand feet, board measure*, annually.

The eastern boundary of the great bituminous coal field of Pennsylvania approaches within about ten miles of the Susquehanna, both at Towanda, in Bradford County, and at Mahoopenny Creek, about forty miles below Towanda, and will make an important addition to the trade to be expected from the North Branch Canal. This coal is nearer to Philadelphia, and also to New York, than any other coal of that character, and can be got to those markets at a cheaper rate by the Lehigh.

Let us now look at some of the sources of business which are more closely allied to the Lehigh route.

## THE COAL TRADE.

The Lehigh works open to the three anthracite coal fields the cheapest road to market. The trade in this article has already reached nearly eight hundred thousand tons, and must yet be considered only in its infancy. It must necessarily increase with the demands for domestic consumption by a rapidly increasing population, and new applications of it are constantly making to the purposes of manufactures and steamboats, which must extend the consumption of anthracite beyond all former anticipations. The following table will show the history of the trade from its commencement.

*Quantity of Anthracite Coal sent to Market from the beginning of the Regular Anthracite Coal Business of Pennsylvania.*

	From the Lehigh.	From the Schuylkill.	From the Lackawana.	Unsold at end of the year.	Total sold.
	Tons.	Tons.	Tons.	Tons.	Tons.
1820	365	None	None	None.	365
1821	1.073	do.	do.	do.	1.073
1822	2.240	do.	do.	do.	2.240
1823	5.823	do.	do.	do.	5.823
1824	9.541	do.	do.	do.	9.541
1825	28.393	7.143	do.	do.	35.536
1826	31.280	16.265	do.	5.000	42.545
1827	32.074	31.241	do.	8.000	60.315
1828	30.232	52.070	do.	12.000	72.302
1829	25.110	78.705	10.000	18.000	107.815
1830	41.750	89.984	43.200	40.000	152.934
1831	40.966	78.005	56.000	None.	214.000
1832	70.000	209.051	85.000	70.000	294.050
1833	123.000	255.000	112.000	135.000	425.000
1834	106.244	226.692	47.000	120.000	394.986
1835	131.250	339.500	90.000	All sold.	680.750
1836	146.522	432.045	110.000	do.	690.567
1837	225.937	523.152	115.387	200.000	664.476
1838	214.211	433.876	64.110	200.000	712.196
1839	221.850	442.607	118.000	200.000	782.458

The depressed state of manufactures, and of business, generally, for several years past, has of course prevented that enlargement of the coal business that would, otherwise, have taken place. The earlier part



of this history shows the reason why so small a proportion of the trade has hitherto been done on the Lehigh. The Schuylkill was in full operation with a slack water navigation for a number of years, while the Lehigh could only be used with temporary boats adapted to the channels of the Delaware river; and these boats required a particular arrangement for getting the lumber and building them, which could not be afforded by individuals working on a small scale. The consequence was, that persons desirous of embarking in the coal business located themselves on the Schuylkill in great numbers, and thus had great advantages over the *single office* of the company in effecting sales and procuring a market. This disparity of production, however, it is believed, is likely soon to be removed by the operations of the various companies which have established themselves on the Lehigh, who will be able to offer terms for their coal more favourable than those of their competitors.

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THE COMPANY'S COAL LANDS, amounting to six thousand acres, comprise the whole of the east end of the first or southern anthracite coal field, beginning on the top of the mountain, about half a mile from the Lehigh river, and near Mauch Chunk, and extend without interruption to Tamaqua, on the Little Schuylkill, a distance of thirteen to fourteen miles. On these lands are found, beginning on the north side of the coal basin, nine veins from five to twenty-eight feet in thickness, making together one hundred and eleven feet. On the south side, which has not yet been so fully examined, are found veins of fifty, twenty, fifteen, and nine feet. This coal is now opened into, from the Room Run Valley, which cuts into the mountain on the northern side of the coal basin, near to its base, and thus exposes the veins above mentioned. At the old mine, five miles west

of Room Run, the vein of fifty or sixty feet, which is the only vein worked at this place, lies as a saddle on the top of a hill nearly as high as the main mountain; here the coal is removed by quarrying in open day. About *thirty* acres in extent have been worked from this single vein, which have produced upwards of *eleven hundred thousand* tons.

From the various openings above mentioned, and other examinations that have been made, it is believed that it is entirely within bounds to estimate these lands to contain at least 30,000 tons of coal to the acre. The quality of the coal is not surpassed by the coal of any other mines.

The mountains on each side, and forming the edges of the coal basin, are about five hundred feet above the adjacent valleys. These mountains, extending about thirteen miles in length, admit of drifts being run towards the bottom of all the veins in the coal basin, by which means the veins can be drained and worked by descending roads from the coal to the river. There is room for more than ten drifts, without interfering with each other. These drifts can be made at a moderate expense when needed, and produce more than 100,000 tons of coal each, per annum.

The Company own the landings for an extent of two miles, along the Lehigh, near Mauch Chunk, and can, therefore, accommodate the coal trade to any required extent.

The rail roads and branches constructed by the Company, from their landings to the Old Mines, and the Room Run Mines, including the branches *in* the mines, amount in the whole, to about 25 miles in length.

The present stock owned by the Company, of mules, cars, &c., is ample for a business of two hundred thousand tons of coal per annum, which quantity was actually brought from their mines in 1837.

It is calculated that ninety thousand acres of the middle, or Beaver Meadow region, and fifty-six thousand acres of the north, or Wyoming region, making, with the six thousand acres owned by the company, one hundred and fifty-two thousand acres of coal land, will find the Lehigh their cheapest road to market. Professor Silliman pronounced the company's mines "inexhaustible;" and they may safely be depended on to supply any demand, when flanked by the other coal regions just mentioned.

The following named companies are already located upon the Lehigh for coal operations.

The Beaver Meadow Rail Road and Coal Co.	}	already in operation.
Hazleton Coal Co.		
Sugar Loaf Coal Co.		
Buck Mountain Coal Co — Rail road		nearly ready for transporting coal.
Stafford Coal Co.	}	making preparatory explorations.
Summit Coal Co.		
Northampton and Luzerne Co.		
Tamanend Mining Co.		
Wyoming Coal Co., in the northern, or Wyoming region, are prepared for operating as soon as the rail road is completed.		

The Little Schuylkill and Susquehanna Rail Road Company have nearly finished the grading of their road from where it joins the Beaver Meadow Rail Road (four miles from the Lehigh,) to Catawissa, on the Susquehanna, and are laying down the rails on the ten miles nearest the Lehigh. This road passes for about twenty miles, through the coal region. It will be a feeder to the Lehigh navigation, both for coal and the products of the Susquehanna country.

The location of the coal lands of the above named Companies and their rail roads to the Lehigh Canal, will be seen by reference to one of the maps annexed to this pamphlet.

The present cost of transportation of coal on the Lehigh and Delaware Canals, including tolls, is one cent, and six-tenths of a cent per ton per mile, and, with a little improvement in the Delaware Canal,

this cost can be reduced to one cent, and four-tenths of a cent per ton per mile: more than half of this is tolls or profit to the canals. For this price contracts can be made with boatmen, who furnish one or more boats, as required, with their own crews, horses, &c. These boats, by being decked, would be capable of proceeding to ports on the North or East rivers without transshipment.

## LUMBER.

The descending navigation above Wright's Creek leads into the heart of a vast forest of white pine and other timber, which can get to market by no other route. The most accurate information that can be obtained relative to it is contained in the subjoined extracts of a letter from an intelligent agent of the company, who has been making diligent inquiries into the subject for some months.

"I forward the most accurate statement that is in my power to obtain, relative to the timber lands in the Valleys of the Lehigh, and its tributaries, giving the number of acres in each valley, and the probable average quantity of lumber per acre which will be manufactured, and sent down the Lehigh Navigation:

Where the Lands are situate.	No. of Acres.	Average No. of 1000 feet per Acre.	Total No. of 1000 feet board meas.
Mud Run, and Painter Creek valleys,	21,000	15 a 20	392,000
Hickory Run, and Hays' Creek, and up as far as south side of Tobyhanna, and up said stream to Pond Creek, - - -	53,300	20	1,176,000
Upper Lehigh—North and west of Lehigh above Stoddartsville, and N. E. of Easton and Wilkesbarre turnpike, including part of Buck township, to its N. E. boundary, where it is terminated by a line of Covington township, - - - -	20,000	20	400,000
Original township of Covington, and at Head of Lehigh—partly over the line of Wayne County, - - - -	103,000	15 a 20	2,010,000



Lower part of Buck township, including the valley of Bear Creek, - - -	15,000	10	150,000
Lands of Pine Forest Company, Wright's Creek and Pine Run, - - -	7,000	35	245,000
Lands on west side of Lehigh, from opposite Mud Run to White Haven, - -	20,000	12	240,000
Eastward of Lehigh, and N. E. of Easton and Wilkesbarre turnpike to extreme head waters of Lehigh, a distance of fifteen miles, in a direct line from Stoddarts-ville—the whole of this section is densely timbered, and very nearly all will go down Lehigh, say three-fourths, or	42,000	15	630,000
North side of Tobyhanna, - - -	13,000	15	195,000
Totals, - - - - -	304,300		5,438,000

Say, total quantity of lumber on said lands five millions four hundred and thirty-eight thousands of *thousand feet, board measure*.

“In making this estimate I have, in some cases, taken it twenty per cent. less than what some of the owners of timber lands think their lands will average per acre, but my estimate, I presume, will very nearly reach the truth.”

“The number of saw-mills erected and erecting, on the upper section of the Lehigh, and its tributaries, is as follows :

	No. of Mills.	No. of Saws.
On the Lehigh, above Stoddartsville, - - - -	4	7
On the Lehigh, at White Haven, - - - -	4	5
On the Lehigh, at Dam No. 19, - - - -	2	4
Stephens' Meadow Run, above Stoddartsville, - - -	1	2
Pond Creek, - - - - -	1	1
Bear Creek, - - - - -	3	4
Tobyhanna Creek, - - - - -	1	2
Pine Run, - - - - -	2	2
Wright's Creek, - - - - -	2	2
Hays' Run, - - - - -	3	3
Hickory Run, - - - - -	6	7
Cressy's Creek, - - - - -	1	1
Two miles west of White Haven, (by steam,) -	1	2
Dreck's Creek, - - - - -	2	2
Mud Run, - - - - -	2	2
Terrapin Pond Creek, - - - - -	2	2
On Lehigh, at Stoddartsville, - - - -	1	1
	38	49

Forty-nine saws, averaging 600,000 feet each, which is a low estimate, would amount to about 30,000,000 per year. The toll is, on an average, \$1 per 1000; of course the number of saws and quantity of lumber manufactured will increase yearly for some years to come."

Eleven roads, together more than sixty miles in length, two of which are rail roads, are now made, or are in the course of construction, by the owners of this lumber, to connect their lands with the Lehigh Navigation.

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## WATER POWERS.

By making the canals on the Lehigh of a large size, so as to admit the passage of boats of the tonnage which could be most profitably and cheaply used in the transportation upon it, the very important collateral advantage was secured, of making provision for the use of the great fall and very abundant water of the river, as a power for driving machinery. The cross section of the Lehigh canals presents an area comparing with the area of the Great Erie Canal, as  $262\frac{1}{2}$  to 136. By this arrangement, it is believed the company now possesses a water power distributed along their line of navigation, and still unappropriated, equal to the power of six thousand horses, after deducting the water necessary to accommodate the navigation, to the extent of two millions of tons annually.

The strips of land between the canals and the river, suitable for the sites for manufactures, have, in most instances, been obtained by the Company, in the settlements for damages.

This water power is situated on a navigation, communicating with the tide waters of New York and Philadelphia, at one end, and at the other with the

north branch of the Susquehanna, which drains northern Pennsylvania, and western New York, a district of country, perhaps, not excelled in fertility, and now containing a population of 1,000,000 souls. That portion of the water power which is to be used, by the water passing from one canal level to another, will be free from all impediments by back water, as the levels must always be maintained at an adjusted height, to accommodate the navigation, which paramount interest, by the necessity of keeping the works in repair, will secure probably less interruption to manufactures than would occur in ordinary locations. These circumstances render the situations on the Lehigh peculiarly valuable for smelting furnaces, in which the detention of a few days might be destructive of the season's business.

The immense quantity of grain from the Susquehanna will here find the principal power for manufacturing it, on its road to Philadelphia or New York. It was a circumstance similar to this that gave rise to Rochester, on the Erie Canal, with its great flour mills, and like causes may be expected to give rise to similar establishments on the Lehigh.

The abundance of iron ore, coal, and limestone, in the immediate vicinity of sufficient water power for the most extensive works, and on a large navigation connected with the best markets, form a combination of advantages peculiar to the Lehigh, and must make an extensive demand for the *power* to manufacture iron in all its branches, from the ore to the various forms in which it is adapted to the uses of the community, and to an extent limited only by the demand for the articles.

The great water power of the Lehigh may, therefore, be fairly expected, and at no distant day, to be fully occupied by business derived from all the above sources, and at the present selling prices, the water power alone may be estimated to produce an income of \$120,000 per annum.

It has been supposed by some persons, that the power of steam, where coal is cheap, is preferable to water power, for the purpose of manufactures. The managers have for some time been examining this question, and present the following comparative view of the cost of using the two kinds of power, as the result of their inquiries:

At South Easton, the company charge an annual rent for water power, of \$3 per inch, which for a sixty horse power, or 400 inches, under a 3 feet head and 20 feet fall, is	- - - - -	\$1200 00
Interest on cost of water-wheel, (\$1000,) and allowance for wear,	- - - - -	200 00
		<hr/>
\$1400 ÷ 60 horses = \$23 $\frac{33}{100}$ per horse power per annum		1400 00 <hr/>
A sixty horse engine, cost \$7000, on which interest per annum,	- - - - -	\$420 00
Repairs, and perpetuating engine, 15 pr ct.,		1050 00
Engineers and firemen, working night and day,	- - - - -	1200 00
Eight lbs. of coal (the <i>lowest</i> estimate,) per horse power, per hour, is 5 tons per 24 hours, and 1825 tons per annum, at \$2 per ton, being the lowest selling price for coal at the coal landings,	- - - - -	3650 00
		<hr/>
\$6320 ÷ 60 horses = \$105 $\frac{33}{100}$ per horse power per annum.		\$6320 00 <hr/>

Showing an annual saving, by using water power instead of steam, of \$82 on each horse power employed, or \$4,920 a-year on a sixty horse power, which is sufficient to drive two furnaces.

It is stated on the authority of Frederick Graff, Esq., the experienced and intelligent superintendent of the Fairmount Water-works, that the expense of



supplying the city of Philadelphia, by steam engines of the most approved modern construction, with the same quantity of water raised by the present works, would be about one hundred and thirty-seven dollars per day; while the cost by water power is only seven dollars per day. Three men attend the works by turns, each being on duty eight hours; and the above is found sufficient for wages, fuel, light, tallow, &c.

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## IRON ORE.

In addition to the veins of iron ore usually met with in the coal fields, a large proportion of the limestone region, extending twenty-four miles along the Lehigh canal, is found to abound with hæmatite ore, of an excellent quality and near to the navigation. The Morris Canal, which connects with the Lehigh at Easton, also passes through beds of stone ore similar in character to that of the famous iron mountain in Missouri, and probably as abundant. It is already ascertained that there are nine veins, and a total thickness of fifty feet; their longitudinal direction is N. E. and S. W., and pitch on an angle  $45^{\circ}$  to  $60^{\circ}$  S. E. Thus every variety of ore seems to be presented, by which the most advantageous mixtures for smelting can be obtained; the interchange of which, and of coal for the operation, cannot fail of producing a large amount of tolls for the navigation, and, by making a freight both ways, materially reduce the cost of freight. The limestone, also, which abounds along the Lehigh, and is necessarily used in large quantities in the smelting of ore, as well as for manuring land, &c., will produce a large tonnage.

As the application of anthracite to the smelting of iron ore has now been successfully made in this coun-

try, as well as in Wales, and the coal, the ores, limestone and water powers are so abundant on the Lehigh navigation, its favourable connexion with markets must induce capitalists to locate themselves there for carrying on the iron business extensively. Some idea may be formed of the extent of this business, by referring to the accounts which have lately been published of the iron manufacture of Wales. The quantity of pig iron manufactured in 1838 was 531,000 tons. Of this quantity 291,200 tons were made into bars. The quantity of anthracite required for this, allowing three tons of anthracite to be equal to five tons of the bituminous coal, would be 1,306,960 tons; the limestone required would be 185,850 tons, and the ore 1,593,000 tons.

A single establishment in Wales, and that not the largest, consumes 200,000 tons of coal annually.

As the Lehigh Company's improvements connect with the three great coal ranges, the nearest of which is owned by them, it will be but fair to calculate upon *their* lands producing one-third of the coal to be used in the iron business.

It must be recollected that the use of anthracite coal in the manufacture of iron, is nearly as new a subject in Wales, as in this country, and that it has been found much cheaper than the bituminous coal used through all other parts of Great Britain. We may, therefore, hope for a fair rivalry with Great Britain in this article, as *we* are commencing the manufacture at the *same time* with her, and can have the materials equally cheap. The only advantage they have over us is in cheap labour, which, on the Lehigh, will be compensated by the use of water instead of steam. From the best information which can be had, it appears that the difference of expense in favour of water power will pay about two-thirds the wages of labour at a furnace, where the steam would be raised by coal costing two dollars per ton.

The Lehigh Crane Iron Company has already erected a large furnace on the Lehigh, about three miles above Allentown, which is *now in successful operation*, and making the best quality of iron. The works are all upon the Welsh plan, and the company have engaged the services of a person highly recommended by Mr. Crane to superintend them. These works are open to the inspection of all who may choose to visit them. Four furnaces are also about being erected at or near Stanhope, on the Morris Canal; and we learn that fifteen thousand tons of coal have already been contracted for on the Lehigh for their supply. It is said two more furnaces will soon be commenced, at South Easton, which, like those on the Morris Canal, will draw all their coal from the Lehigh.

A vein of ore, twelve feet thick, has lately been discovered on the Lehigh and Susquehanna Rail Road, at Solomon's Gap.

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## TOWN PLOTS.

In the arrangements for the descending navigation a large body of lands were purchased, at very low prices, along the Lehigh, for the supply of lumber for the boats; and in the settlement for damages by the ascending navigation, many narrow strips of land were taken by the company. In many places these have become very valuable, as scites to use the water power upon, and furnish the locations of several flourishing towns. South Easton was thus located on the company's property, near the mouth of the Lehigh, where about two thousand inches of water power are already employed in manufactures, and a flourishing village has sprung up. Mauch Chunk, the shipping port of

the first coal region, has also been built up on the company's property, and must continue to thrive and extend itself with the extension of the coal business. So with White Haven, at the junction of the Lehigh and Susquehanna Rail Road with the slack water navigation. A number of buildings are already erected there, and occupied as dwellings, saw-mills, stores, taverns, &c. It will, of course, be the shipping port of all the trade brought by the rail road from the Susquehanna, for which it offers every convenience, and must necessarily become a large and important town.

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*Statement of the Capital Stock and Permanent Loans, and of the Cost of the Permanent Works and Real Estate of the Company. Jan. 1, 1840.*

Capital Stock, 30.071 shares, \$50 each, 1.503.550

Permanent Loans, namely—

At five per cent. \$1.253.086.35, }	4.011.503 32
“ six per cent. 2.758.416.97, }	

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Making the whole amount of stock and

loans, January 1, 1840,      -      -	\$5.515.053 32
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Expenditures to the same period.—Total cost of the Lehigh Navigation from the River Delaware at Easton, to Wright's Creek, above White Haven, being 72 miles of canal and slackwater for boats of 120 tons burden, and 12 miles of descending navigation for rafts from Stoddarts-ville to Wright's Creek,—the whole being divided by law into two grand sections: namely—

Lower Section opened in 1829,	2.012.756 37
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Upper Section opened in 1838,	1.695.506 40
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\$3.708.262 77



A committee of the Senate of Pennsylvania, (Mr. Packer, Chairman,) in a Report read in Senate March 4, 1834, speaking of the Lower Section of the work from Easton to Mauch Chunk, stated as follows:—" *The Lehigh Navigation is admitted to be superior in all respects to any other work of a similar nature in the United States;*" \* \* \* \* and, referring to the *cost*, that "The same work would, perhaps, have cost the State *double* this sum."

Expenditures to January 1, 1840, on the rail road connecting the slack water navigation of the Lehigh at White Haven, with the north branch of the Susquehanna Canal at Wilkesbarre, 20 miles long, including cost of the rails and engines, - - -

762.735 86

This road is now (July, 1840,) so nearly finished, that three-fourths of it are now in use. The entire road is estimated (from the contracts actually made to finish it) to cost, when completed, not over \$1.000.000. When it is recollected that this road is the *connecting link* between the upper Susquehanna and the important markets of New York and Philadelphia, and that almost every article transported upon it, will also be conveyed and pay tolls on *seventy-one* miles of the Lehigh Navigation, its cost must be considered moderate in comparison with the advantages to be derived from it as a *feeder* to the navigation.

Expenditures for <i>improvements</i> made upon the coal and other lands of the Company, including cost of rail roads and branches amounting to about twenty-five miles to and <i>in</i> the old mines and Room Run Mines; also mills, store-houses, and numerous other buildings at Mauch Chunk, &c.; and extensive wharves, landings, &c., constructed at Philadelphia and elsewhere; and including also the amount of the <i>purchase money</i> paid for all the coal and other lands and real estate owned by the Company,		710.989 24
Amount of cash on hand, January 1, 1840,		298.712 96
		<hr/>
		\$5.480.700 83
Balance, being a portion of the capital employed in the coal business, }	34.352 49	
		<hr/>
		\$5.515.053 32
		<hr/>

After deducting the dividend declared January 6, 1840, which amounted to \$57.553.25, there remained a surplus of \$200.364.06, being the aggregate accumulation of *reserved* profits of several preceding years, including a contingent fund of \$50.000, which is set apart under a provision of the By-Laws.

It will be recollected that the above statement includes only the *actual cost* of the various properties, without any consideration of their *enhanced value*. Almost the whole of the real estate on the Lehigh, the six thousand acres of coal lands included, was purchased before the construction of the navigation, at a very low rate, and the company, of course, will

enjoy all the increase in value resulting from the improvements.

The navigation of the Lehigh, and the rail road connecting it with the Susquehanna, have been constructed on terms as low as equally permanent works could now be made for; and by being made *at first* of the proper dimensions, the necessity of reconstructing them for the purpose of enlargement, is entirely avoided. To enlarge the Erie Canal to about the same capacity as the Lehigh, New York has decided upon expending upwards of *twenty millions* of dollars, and *then* the Lehigh route will still have the advantage of the Erie Canal in the *choice of markets*, and in being *longer navigable* from its more southern location.

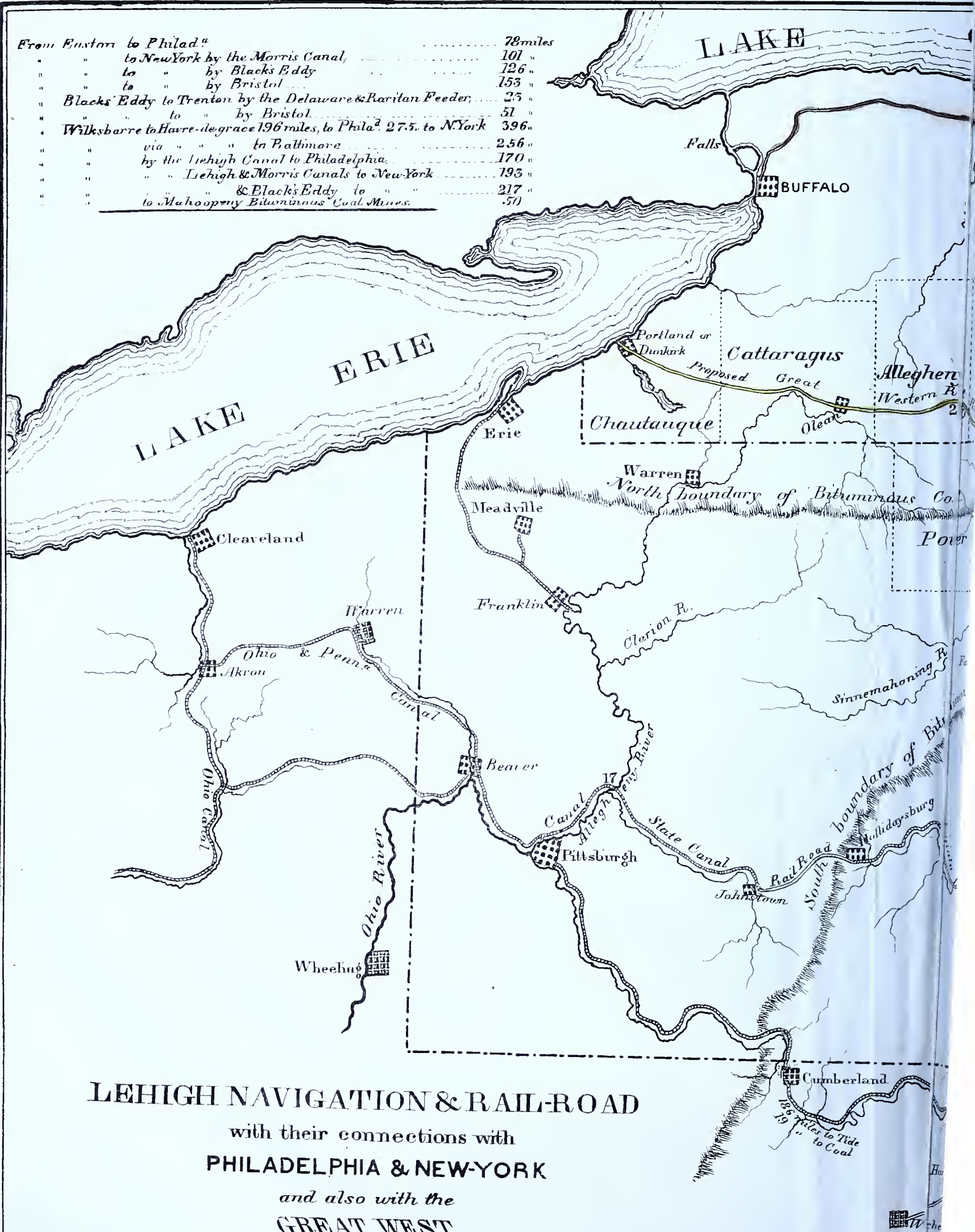
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A history of the Lehigh Coal and Navigation Company, from its earliest infancy has thus been furnished. Its growth has been seen till it has nearly reached manhood. Examine its present position. See its immense property in coal and other lands; its navigation and rail roads penetrating the vast regions of timber, and coal, and iron ore, and limestone, with abundant power for manufacturing them; and at the same time connecting the two best Atlantic markets, by the shortest, cheapest, and most southern route, with a boundless country intersected by upwards of seventeen hundred miles of canals, and several times that amount of lake and river navigation, teeming with all the products of agriculture, and requiring all the manufactures of our own and of foreign countries in return,—and then decide if there can be a doubt of such an institution proving prosperous, affording perfect security for the regular repayment of all the loan-holders, and amply reimbursing the stockholders for their investments.

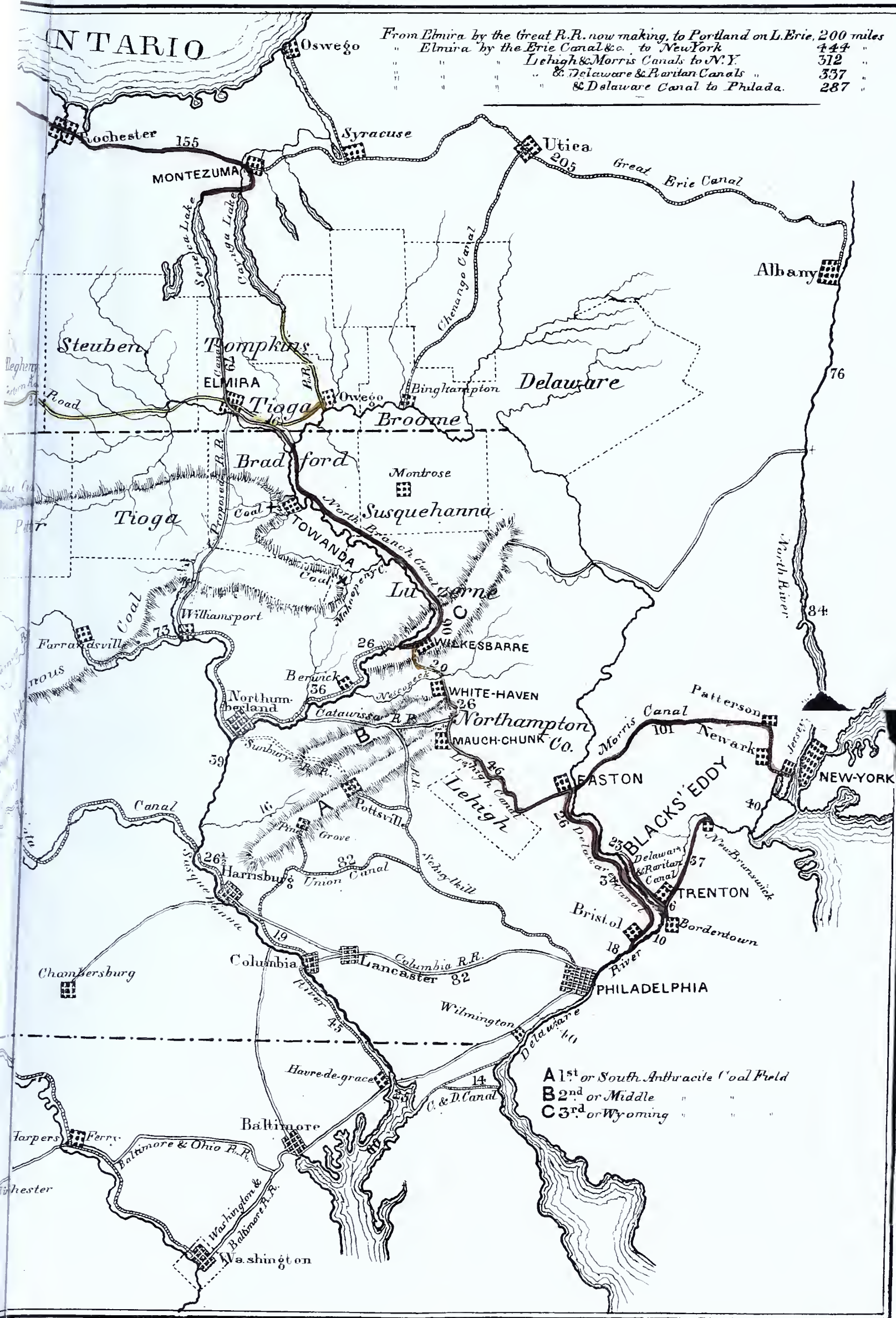
of  
east, and with Lake Erie at Buffalo and at Portland, or Dun-



From <i>Buxton</i> to <i>Philad.</i>	78 miles
" " to <i>New York</i> by the <i>Morris Canal</i> ,	101 "
" " to " by <i>Blacks Eddy</i>	126 "
" " to " by <i>Bristol</i>	153 "
<i>Blacks Eddy</i> to <i>Trenton</i> by the <i>Delaware &amp; Raritan Feeder</i> ,	25 "
" " to " by <i>Bristol</i>	51 "
<i>Wilkesbarre</i> to <i>Havre-de-grace</i> 196 miles, to <i>Phila.</i> 27.5, to <i>N York</i>	396 "
" " via " " to <i>Baltimore</i>	256 "
" " by the <i>Lehigh Canal</i> to <i>Philadelphia</i>	170 "
" " <i>Lehigh &amp; Morris Canals</i> to <i>New York</i>	193 "
" " & <i>Blacks Eddy</i> to " "	217 "
" " to <i>Mahoning Bituminous Coal Mines</i>	50 "



From Elmira by the Great R.R. now making, to Portland on L. Erie,	200 miles
Elmira by the Erie Canal & Co. to New York	444 "
Lehigh & Morris Canals to N.Y.	312 "
& Delaware & Raritan Canals "	337 "
& Delaware Canal to Philada.	287 "





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SUMMARY  
OF THE  
PROPERTY AND BUSINESS PROSPECTS  
OF THE  
COMPANY.

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THEY own the following property:—

1. The eastern end of the first coal region, with the improvements thereon, capable of supplying coal of the best quality at the rate of a million of tons annually for a century.

2. The water power of the Lehigh, sufficient to drive two hundred furnaces for smelting ore; which would require, annually, to keep them in operation, 1,000,000 tons of coal, 1,500,000 tons of ore, and 500,000 tons of limestone.

3. The strips of land along the navigation, in most cases, which will be required to use the water power upon.

4. The land in all the leading places along their works necessary for town plots as places of business, as South Easton, Mauch Chunk, White Haven, and Nesquehoning.

5. The slack water navigation (seventy-two miles) and descending navigation (twelve miles) of the Lehigh. The former calculated for boats of 120 to 150 tons, and capable of passing more than 2,500,000 tons annually, connecting with the rail road to Wilkesbarre. The descending navigation penetrating into the immense forests of white pine and other lumber.

6. The rail road of 20 miles connecting the slack water navigation of the Lehigh with the Pennsylvania Canal, along the north branch of the Susquehanna. Fifteen miles of this road are now in use, and the remaining five miles will be passable in a few months, and capable of transporting more than 500,000 tons a-year. Its capacity can be readily increased as business may require it. A reference to the map will show the connexions of the rail road and navigation, with the markets to the south-east, and with Lake Erie at Buffalo and at Portland, or Dun-



kirk, to the north-west, and with the West Branch and Juniata Canals to the south-west. This road will, with a little arrangement, be capable of transporting loaded boats without transshipment.

The following property depends upon the Lehigh improvements for its whole value, as being the only outlet to market.

1. Ninety thousand acres of coal land, in the middle or second coal region.

2. Three hundred thousand acres of pine timber land, estimated to cut more than five millions of thousand feet of lumber.

The following districts can send their produce to New York or Philadelphia by the Lehigh route cheaper than by any other route:—

1. Fifty thousand acres of the third, or Wyoming coal field, and the produce generally of the Upper North Branch. By the *Lehigh* route the distance from the North Branch Canal at Wilkesbarre to Philadelphia is 100 *miles less*, and to New York 168 *miles less* than by any other route.

2. The bituminous coal field, near Towanda and Mahopenny, which is the nearest coal of this description to Philadelphia and New York.

3. Fourteen counties up the Susquehanna, and in the southwestern part of New York. These counties now contain about 1,000,000 of inhabitants.

4. The west branch of the Susquehanna. The trade from Northumberland can reach New York, by the Lehigh route, in less distance by from one-eighth to one-fifth than by any other route.

5. From the mouth of Juniata Canal to New York is nearer by the Lehigh and Morris Canals than by any other route.

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#### ADDITIONAL SOURCES OF BUSINESS.

1. The connexion of the works of the company with New York and Philadelphia, and through them with all the Atlantic ports, will afford a most extensive market for coal, lumber, iron, and other products which will take this route. The population within ten miles of tide water, and which will eventually become consumers of coal, is now more than four millions. The population of England, where coal is the only fuel, consumes at the rate of one ton of coal per annum to each individual. This will afford a criterion to judge what will eventually be the consumption of coal in this country.

2. The immense country drained by the Mississippi and the St. Lawrence, exceeding 1,500,000 square miles in extent, intersected by 1721 miles of canals, now constructed and being constructed, and by 8400 miles of natural steamboat navigation, and *now* containing a population of about 6,000,000 souls, has but two natural outlets to market for all its productions; the one by New Orleans, subject to the fevers of a tropical climate, and a temperature which speedily destroys agricultural products and injures many other species of merchandise; the other by the St. Lawrence, 4000 miles from New Orleans, and locked up for more than half the year by ice and dense fogs. Pennsylvania, New York, Massachusetts, Maryland and Virginia have, for many years, endeavoured to get a middle communication by canal or rail road with this vast interior country between the two outlets already mentioned. Pennsylvania has effected it by canal, with a short rail road over the dividing summit. New York succeeded in a water conveyance throughout. The Pennsylvania improvements have been extended by the tide water canal to within the reach of Baltimore, both by water and rail road, at Port Deposit. The New York Canal is also reached, at Albany, by a rail road from Boston. The *Lehigh* improvements will now be connected with the Erie Canal at Montezuma, leading to Buffalo; and at Elmira, with the great western rail road through New York, leading to Dunkirk, or Portland, on Lake Erie; and will form a *cheaper, shorter, and more southern route* to Philadelphia, from those points on Lake Erie, than by the Erie Canal to either New York or Boston, or than by the Susquehanna Canal to tide water, and about equally short with the Erie Canal route to New York, with the advantage of the choice of Philadelphia or New York as a market. And these cities are considered the best markets for the produce of the west, and have hitherto supplied the principal portion of the merchandise demanded by the west in return.

The five principal points through which the trade of the west will be carried are Cleaveland, Pittsburgh, Erie, Portland, and Buffalo. The trade of Cleaveland and Pittsburgh may go by Juniata to Philadelphia and New York, as the nearest, though not the cheapest route. That by Erie, Portland and Buffalo will take one of the routes through New York, and be divided between them and the Pennsylvania improvements through the *Lehigh*, in their passage to Philadelphia and New York. By reference to the table of distances and map accompanying this, it will be seen that the *Lehigh* works form a link

in the chain of improvements for carrying this great trade, of as much importance as any other link in the great whole.

3. The very large quantities of iron ore found on the Lehigh and Morris Canals, with the limestone, coal, and water power will inevitably produce an immense amount of tonnage for the Lehigh, independent of all other business. No other business can probably be found which produces so much freight for a navigation as the manufacture of iron. To make a ton of pigs will require about two tons of coal, two to three tons of ore, and a half to one ton of limestone, or about five tons of freight for each ton of pigs. And the conversion of the pigs into bar iron will also create freights equal to three or four tons for each ton of iron. The *Lehigh Company* will not only derive an income from the tolls on the iron manufacture, but also from the profits on the sales of water power, coal, and iron ore, all of which they own in abundance.

## ADDENDA.

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The following are extracts from the report of the Canal Commissioners of Pennsylvania, Messrs. James Clarke, Edward B. Hubley, and William F. Packer, for the year ending October 31, 1839, communicated to the legislature in January, 1840. The extracts are taken from those portions of the report under the heads of "*Delaware Division*," and "*North Branch Extension*."

### DELAWARE DIVISION.

"From the immense amount of tonnage which will be thrown upon this canal, by the extension of the Lehigh Navigation twenty-six miles above Mauch Chunk, through the heart of the coal regions, and the railway now nearly completed from the Lehigh to the Susquehanna, the Board would recommend that the capacity of the canal should be increased by widening the locks. They are at present 90 feet in length and but 11 feet in width, which will only admit the passage of boats of about sixty tons burden, while the water line of the canal is forty feet, and its depth five feet, sufficient to pass boats of one hundred tons burden, if the locks were 90 feet long and 17 feet wide, the size of those upon the Susquehanna. It may, however, hereafter become necessary to enlarge the capacity of the entire canal, to enable it to accommodate the increased business, which will unquestionably be thrown upon it by the numerous companies concerned in the vast coal and pine regions of the Lehigh, and the tonnage which may be safely calculated upon from the Lehigh and Susquehanna, and the Catawissa rail roads."

### NORTH BRANCH EXTENSION.

"The design of the Legislature in authorizing the extension of the North Branch Division to the State line, was to effect a connexion between the improvements of New York and Penn-



sylvania. This connexion is of immense importance to the interests of both States—it will not only add materially to the business done on the public improvements of both, but to the permanent wealth of large sections of the territory of each.”

\* \* \* \* \*

“During the past summer the board visited and examined the country around the northern termination of this line of improvements, as well as the contemplated connexions with it in New York. That State has already extended her improvements so as to intersect the Susquehanna by canals, at two points, viz: By the Shenango Canal, from Utica on the Erie Canal, to Binghampton on the Susquehanna, thirty-nine miles from the State line, near Athens, and also from Montezuma, on the Erie Canal, by Seneca Lake and the Chemung Canal, to Elmira on the Chemung branch of the Susquehanna, sixteen miles above the State line near Athens. A connexion has also been formed from Montezuma, by the Cayuga Lake and the Ithaca and Owego Rail road, to Owego on the Susquehanna, eighteen miles from the State line. By surveys made under the direction of the Canal Commissioners of New York, it has been ascertained that a connexion by either of these routes is entirely practicable; and from the deep interest which that State has in accomplishing that object, this board can entertain no doubt that it will before long be undertaken and completed. It is submitted to the Legislature whether sound policy requires the adoption of any measures on the part of Pennsylvania to secure concert of action between that state and this.”

THE END.

# OFFICERS

OF

THE LEHIGH COAL AND NAVIGATION COMPANY,

FOR THE YEAR

**1840.**

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*President.*

JOSEPH WATSON.

*Managers.*

JOSIAH WHITE,  
ERSKINE HAZARD,  
TIMOTHY ABBOTT,  
THOMAS EARP,  
JOHN COOK,

JOHN M<sup>c</sup> ALLISTER,  
JAMES M<sup>c</sup> ALPIN,  
NATHAN TROTTER,  
JOSEPH R. JENKS,  
WILLIAM H. HART.

*Treasurer.*

OTIS AMMIDON.

*Secretary.*

EDWIN WALTER.







